THE SOLAR CIRCULATION CONCEPT (IN THE PERSPECTIVE OF NICOLAUS COPERNICUS IN *ON THE REVOLUTIONS OF THE HEAVENLY SPHERES* BOOK AND FAKHR AL-DĪN AL-RĀZI'S INTERPRETATION IN *MAFĀTIḤ AL-GHAYB TAFSĪR* BOOK)

THESIS

Submitted to the State Institute of Islamic Studies of Jember in partial fulfillment
of requirements for degree of Bachelor in Religion (S. Ag)
Faculty of Ushuluddin, Art, and Humanities
Department of Qur'anic Science and Interpretation

By:

MA'ISYATUSY SYARIFAH
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STATE INSTITUTE OF ISLAMIC STUDIES OF JEMBER
FACULTY OF USHULUDDIN ART AND HUMANITIES
DEPARTMENT OF QUR'ANIC SCIENCE AND INTERPRETATION
2018

THE SOLAR CIRCULATION CONSEPT
(In the Perspective of Nicolaus Copernicus in *On the Revolutions of the Heavenly Spheres* Book
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Day : Tuesday
Date : April 3rd, 2018

Board of Examiner

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Acknowledge
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MOTTO

وَسَخَّرَ لَكُمُ الشَّمْسَ وَالْقَمَرَ دَائِبَيْنِ وَسَخَّرَ لَكُمُ اللَّيْلَ وَالنَّهَارَ

"And he hath made subject to you the sun and the moon, both diligently pursuing their courses and the night and the day hath (also) made subject to you"[1]

(Ibrahim: 33)

[1] Tim Qomari, *Al-Qur'an Terjemah Paralel Indonsia Inggris*, (Solo: Qomari, 2012), p. 259

DEDICATION

This thesis is special gift for

My beloved *Ummi* Hj. Zamratul Hasanah Chais, *Abi* H. Fawahim Syarif, and my dearest brother Ahmad Zadul Ma'ad Syarif

Faculty of Ushuluddin, Art, and Humaniteies

&

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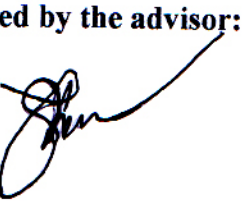

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ABSTRACT

Ma'isyatusy Syarifah, 2018: The Solar Circulation Concept (In the Perspective of Nicolaus Copernicus in *On the Revolutions of the Heavenly Spheres* Book and Fakr al-Dīn al-Rāzi in *Mafātiḥ al-Ghayb* Tafsir Book)

Al-Qur'an sebagai otoritas utama dalam agama Islam, mengajarkan bahwa alam semesta beserta isinya bukanlah merupakan realitas independen melainkan tanda-tanda (*sign*-ayat). Hal ini yang kemudian menjadikan para *mufassir* tertarik untuk menafsirkan ayat-ayat *kauniyah*, hingga lahirnya corak penafsiran "*tafsir ilmi*". *Mufassir* yang tergolong memilki corak penafsiran tafsir ilmi adalah Fakr al-Dīn al-Rāzi banyak mengulas ayat-ayat *kauniyah* dalam kitab tafsirnya yaitu *Mafātiḥ al-Ghayb*, salah satunya adalah tentang peredaran matahari. Perdebatan terkait peredaran matahari di kalangan ilmuan astronomi memang tidak ada habisnya, hal ini disebabkaan karena perbedaan pendapat ilmuan yang mengatakaan bahwa bumi sebagai pusat tatasurya, sedangkan ilmuan yang lain mengatakan bahwa matahari sebagai pusat tatasurya. Dalam hal ini Nicolaus Copernicus merupakan salah seorang astronom yang mengatakan bahwa Matahari adalah pusat peredaran tata surya dengan teori yang dikenal dengan Heliosentrik yang dituangkan dalam karyanya yang berjudul *On the Revolutions of the Heavenly Spheres*.

Berdasarkan penjelasan di atas, peneliti merasa perlu untuk meneliti peredaran matahari perspektif Nicolaus Copernicus dan Fakr al-Dīn al-Rāzi. Fokus masalah dari penelitian ini adalah *pertama*, bagaimana konsep peredaran matahari menurut Nicolaus Copernicus. *Kedua*, bagaimana konsep Fakr al-Dīn al-Rāzi dalam kitab Tafsir *Mafatih al-Ghayb* tentang konsep peredaran matahari, dan yang *ketiga* bagaimana persamaan dan perbedaan konsep peredaran matahari menurut teori Heliosentrik Nicolaus Copernicus dan penafsiran Fakr al-Dīn al-Rāzi dalam kitab Tafsir *Mafātiḥ al-Ghayb*. Tujuan dari penelitian ini adalah untuk mengetahui peredaran matahari menurut teori Heliosentrik Nicolaus Copernicus dan penafsiran *Fakhr al-Din al-Razi* tentang peredaran matahari dalam kitab Tafsir *Mafatih al-Ghayb*, serta menjelaskan persamaan dan perbedaan pendapat keduanya.

Penelitian ini menggunakan pendekatan *Adaby* dan History, dengan metode deskriptif-analitis, dan jenis penelitiannya library research. Teknik pengumpulan data dalam penelitian ini menggunakan teknik dokumenter.

Hasil penelitian ini adalah: Nicolaus Copernicus dan sepakat bahwa matahari merupakan pusat tata surya. Sedangkan ada 3 perbedaan menurut keduanya: 1) Menurut Copernicus matahari hanya diam pada tempat edarnya, sedangkan menurut al-Rāzi matahari berjalan mengelilingi bumi. 2) Planet yang mengelilingi matahari menurut Copernicus ada Sembilan, sedangkan menurut al-Rāzi ada tujuh. 3) Planet-planet yang mengelilingi matahari dengan putarannya berbentuk orbit elips, sedangkan menurut al-Rāzi berbentuk bulat.

Kata Kunci: Teori Heliosentrik, Peredaran Matahari

PREFACE

Praised be to Allah the Merciful and the Gracious that has given mercies and blessings to me then this thesis done. *Sholawat* and *salam* always to the greatest prophet Mohammad SAW who teach the human being to be good creature.

The authors realize that many people have contributed direct and indirectly in making possible the completion of this thesis project. That's why the author would like to say many thanks for:

1. Rector of IAIN Jember, Prof. Dr. H. Babun Suharto, SE., MM.
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5. Win Usuluddin, M. Hum., as my advisor of this thesis, thanks for academic input including motivation and spirit to immediately finish this thesis.
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12. Seniors (*Mbak* Azizah, *Mas* Musa, *Mas* Fakhruddin, and *Mas* sadid) who have provided much input and references to the author.

Finally, this writing is not the end result, but there are still many shortcomings that require the author to perfect it. And Allah belongs to all perfection, so that no human being can claim to know anything in absolute terms.

Jember, March 19th 2018

The Author

ARABIC-LATIN TRANSLITRATION

Transliteration Table					
Single Vocal				Long Vocal	
ا	A	ط	T	ا	Ā/ā
ب	B	ظ	Zh	و	Ū/ū
ت	T	ع	‘	ي	Ī/ī
ث	Ts	غ	Gh		
ج	J	ف	F		
ح	H	ق	Q	-	A
خ	Kh	ك	K	-	I
د	D	ل	L	-	U
ذ	Dz	م	M		
ر	R	ن	N	يّ	Yy
ز	Z	و	W	وّ	Ww
س	S	ه	H		
ش	Sy	ء	’		
ص	Sh	ي	Y	يْ	Ay
ض	Dl			وْ	Aw

LIST OF CONTENT

CHAPTER I

INTRODUCTION

A. Background

Quran believed of muslim people as holy book that always flexible in all the times and spaces *(Al-Qur'ān Shāḥiḥun fi kulli al-zamān wa al-makān)*, this shows that Qur'an will never be contrary to all disciplines. Qur'an does not give detail instructions for all things, but Qur'an provides the basic reasons to be extracted and processed, so it will be beneficial for human life. Even though Qur'an only explains it globally but Quran will always be the explanation and reference of science. There have been many verses of Qur'an which suggest that people should always think and understand the meaning of the Qur'an about what in this universe that Allah propose to behold what is in the heavens and the earth cause everything that created always give much benefits.

Qur'an as the main authority in Islam is considered that the universe and its contents are not as the independent reality and the ultimate, but it becomes the sign verses.[1] This makes *mufassir*[2] interested in interpreting the verses, one of which is the *kauniyah*[3] verse, until it produces a style of interpretation *tafsīr 'ilmi*[4] or scientific Interpretation. Nevertheless, the existence of *tafsīr 'ilmi* becomes the debate among *mufassir*, some of them refuse and others accept. *Mufassir* who refuse to argue relating Qur'an with scientific theories, say that it is a wrong act because it will give result that matching Qur'an is an coercion act of interpretation,

[1] Andi Rosadisastra, *Metode Tafsir Ayat-ayat Sosial*, (Jakarata: Amzah, 2007), p. 1.
[2] *Mufassir* is from arabic language, that is the interpreter of Quran.
[3] *Kauniyah* is the verse of Qur'an that explain about the sign of Allah in the universe.
[4] *Tafsir Ilmi* is the one of kinds of Qur'an interpretation that explain about empirical science, and is one of contemporary exegesis.

until Qur'an is merely becoming a supporter to explain the scientific theories, those theories certainly can reduce the miracles of Qur'an, so it is feared that Qur'an will be adapted to the findings and scientific theories and not even otherwise.[5] Thus by the existence of *tafsir 'ilmi* is considered that Qur'an seems to be regarded as a science book or science encyclopedia and it is no longer sacred as a holy book. While commentators who accept the argument consider that the interpretation has contained and covered various scientific disciplines and scientific theories that can only be expressed to this modern era.

The solar circulation is part of the astronomy has been discuss that the one of *tafsīr 'ilmi* content. The science of astronomy began to be categorized as part of mathematics by Muslim scientists in the Middle Century.[6] The efforts which made by Muslim scientists in this astronomical discipline are the majority composed in the real movements studies of the sky objects and recorded in mathematical numbers, to the phenomena such as starlight and the objects, such as the meteors and comets and they are submitted to the field of physics and metaphysics as the basic nature of astronomy because it cannot be separated from the calculations. At first, the concept of the planet was inherited by the Greeks to a civilization which continued to establish that the earth as the center of the sky objects rotates around it. A long before the Muslim astronomers developed their advanced observational and theoretical method, the Muslim astronomers have already possessed the expertise in applying astronomical knowledge such as the

[5] Rosihon Anwar, *Ilmu Tafsir (Edisi Revisi)*, (Bandung: CV. Pustaka Setia, 2015), p. 15.
[6] Howard R. Turner, *Science in Mediaval Islam, An Illustrated Introduction* (University of Texas Press, Austin, 1997) translated by Zulfahmi Andri, *Sains Islam yang Mengagumkan: Sebuah Catatan terhadap Abad Pertengahan*, (Bandung: Penerbit Nuansa, 2004), p. 71.

existence of *falak*[7] and *rukyat*[8] science. In revealing the phenomena of nature, it is not surprising that use Qur'an as a reference, because Qur'an is the source of all knowledge sources. But it is needed to remember that Qur'an is not a book of knowledge, but a guidance of human life. As Imām Ghazali reveals that the past, current and future science are all presented in Qur'an.[9] If Qur'an is the source of all knowledge, of course the sciences which spread on the earth surface can be reviewed by the understanding of Qur'an verses.

Along with the time developing and the development of style and methodology of interpretation, the scientific interpretation increasingly becomes a scientific reference in research and science discovery because Qur'an is believed to be the guidance of all things in human life. It is included the discussion of sun in Qur'an which is mentioned with the word الشَّمْسِ in 32 times and all in the form of *mufrad* shape.[10] Among others are (QS 2: 258), (QS 6: 78), (QS 6: 96) and so on.

The debate around the solar circulation among the astronomy scientists is endless. This is caused by the difference opinion of every scientist who says that the sun as the center of the solar system while other scientists say that the earth is the center of the solar system. Nicolaus Copernicus is one of the astronomers who say that the sun is the center circulation of the solar system in the 16th century.[11] This theory is later proved by Galileo Galilei and other celestial observers, and it

[7] *Falak* is the term from of arabic language about spheres science.
[8] *Rukyat* is near meaning with falak, that is science about stars research
[9] Gus AA, *Matematika Al-qur'an*, (Surakarta, Rahma Media Pustaka, 2004), p. 5.
[10] Quraisy Shihab, *Ensiklopedia al-Qur'an: Kajian Kosa Kata*, (Jakarta: Lentera Hati, 2007), p. 297.
[11] Agus Mulyono dkk, *Fisika dan al-Qur'an*, (Malang, UIN Malang Press, 2006), p. 46- 47.

is also strengthened by Kepler's law.[12] The theory which known as Heliocentric theory breaks the Geocentrism theory (earth as the center of the solar system) proposed by Ptolemy. In 1543 AD due to the Copernican revolution, there was much displeasure, especially among church clergymen. The cause was Copernicus's opinion that was contrary to their religious doctrine. Copernicus was considered to be contrary to the church doctrine, because he had succeeded in lowering the honorable degrees of the earth which is no longer as the center of the universe, but replaced by the hot matter of the sun.

The author interested in researching the solar circulation theory in the perspective of Heliocentric theory of Nicolaus Copernicuss and the thought of Fakhr al-Din al-Razi, because the Copernicus's theory has broken the Geocentrism theory, also the Heliocentric theory of Nicolaus Copernicuss receives a great attention from the later philosophers. After a long and deep observation and research, they justify, support and refine the Heliocentric theory of Nicolaus Copernicus. They are Isaac Newton (1642-1727 AD) 10, Galileo Galilei (1564-1642 AD) and Johannes Kepler (1571-1630 AD). Then the author also compares the Heliocentric theory with the thought of Fakhr al-Dīn al-Rāzi in his book *Mafātiḥ al-Ghayb* which is very efficient in describing the interpretation of *kauniyah* verses by give the explanation of science, because the educational background of Fakhr al-Dīn al-Rāzi is likely to the philosophy and science. Thus Fakhr al-Dīn al-Rāzi's knowledge is important in understanding the *kauniyah* verses.

[12] Nadiah Thayyarah, *Buku Pintar Sains dalam Al-Qur'an*, (Jakarta: Zaman, 2013), p. 323.

Mafātiḥ al-Ghayb book is from 32 volumes thick, printed and spread among the educated people, until this book becomes the great interest to the Qur'an's students because it contains a deep discussion covering the various scientific problems, so it is said that this book collects all the strange and unfamiliar problems.[13] Fakhr al-Dīn al-Rāzi's expanse in various discipline sciences and his noble intent to generate the spirit of scholarship among the Muslims, lead his interpretation works out to the context itself. Some *mufassir* say that this interpretation book فيه كل شيء الا التفسير which means in this book covers everything except for commentary itself, this is alleged to *Tafsir al-Kābir* or *Mafātih al-Ghayb*.

Therefore, should be able to catch the meaning and content of Qur'an verse interpretation behind its extensive discussion demands the foresight and the most contented of the book. Almost all the disciplines, both religious sciences that have developed at that time such as *kalām*[14], *fiqih*[15], sufism, language, and philosophy, also new sciences such as Astronomy and other natural sciences are used as analytical tool to understand Qur'an.[16] This is what makes this interpretation has advantages over other works of interpretation, because almost all disciplines of science are included in this book. Besides this interpretation book is categorized

[13] Mani' Abd Halim Mahmud, *Metodologi Tafsir (Kajian Komprehensif Metode Para Ahli Tafsir)*, (Jakarta: PT. Grafindo, 2006), p. 323.
[14] *Kalam* is science about Islamic theology
[15] *Fiqih* is the one of Islamic science that explain about Islamic low, such us about worship, social interaction etc.
[16] Ibid, p. 25.

as interpretation *bi al-ra'yi*.[17] Because the use of ra'yi is more dominant than the use of history made. Despite the use of *israiliyyat* reports, the use of the *marfu'*, *mauquf*, and *maqthu'* reports, both valid and false still exists this interpretation. The new discoveries of science also exist in this commentary, so it is categorized as the style of *tafsīr 'ilmi* in this *fiqih tafsīr* law.

The author want to reach more deeply about Fakhr al-Dīn Rāzi's thought especially his interpretation about solar circulation in his tafsir book *Mafātiḥ al-Ghayb*, and explore the distinction of his interpretation with heliocentric theory of Nicolause Copernicus in his book *On the Revolutions of Heavenly Spheres*.

B. Focus of Study

This part is a development of the problem background description which shows and strengthens that the problem which will be examined, is unresolved or unanswered yet.[18]

1. How is the solar circulation concept according to of Nicolaus Copernicus in *On the Revolutions of Heavenly Spheres* book?
2. How is the solar circulation concept according to Fakhr al-Dīn Rāzi in *Mafātiḥ al-Ghayb Tafsir* book?
3. What is the different and similarities of the solar circulation concept according to Nicolaus Copernicus in On the Revolutions of Heavenly Spheres book and Fakhr al-Dīn Rāzi *in Mafātiḥ al-Ghayb Tafsīr* book?

[17] *Tafsīr bi al-Ra'yi* is also referred to the tafsir bi al-diroyah which is the result of interpretation and explanation derived from ijtihad and mufassir thought which the mufassir has complied with the requirements as a mufassir, understood the legal argument, as well as interpretation problems such as asbab nuzul, munasabah nasakh mansukh etc. al-Dzahabi, "*al-Tafsīr wa al-Mufassirūn"*, (Cairo: Dar el-Hadits, 2005) p. 254

[18] Tim Penyusun, *Pedoman Penulisan Karya Ilmiah* (Jember, IAIN Jember Press, 2015), p. 51.

C. Purpose of Study

Research objective is a description about the meaning and the direction which will be aimed in conducting the research.[19]

1. To explain the solar circulation concept according to Nicolaus Copernicus in *On the Revolutions of Heavenly Spheres* book.
2. To explain the solar circulation concept according to Fakhr al-Dīn al-Rāzi in *Mafātiḥ al-Ghayb Tafsīr* book?
3. To explain the different and similarities of the solar circulation concept according to Nicolaus Copernicus in *On the Revolutions of Heavenly Spheres* book and Fakhr al-Dīn al-Rāzi in *Mafātiḥ al-Ghayb Tafsir* book.

D. Significance of the Study

1. For the researcher

   This research is expected to be able to increase the knowledge and science of a researcher toward the science interpretation about the study of solar circulation in the perspective of Nicolaus Copernicus and Fakhr al-Dīn al-Rāzi.

2. For the readers and wide communities

   This research is expected to be able to give a positive contribution toward the development of scientific knowledge of Qur'an, especially in the interpretation aspects and the interpretation of solar circulation. Besides that, this research can be made as the additional information, reference, and source material in conducting further researches.

[19] *Ibid*, p. 52.

3. For IAIN Jember

For the institution part of IAIN Jember, especially for Faculty of Ushuluddin, Art, and Humanities, the research result is expected to be the addition academic references in developing Qur'anic science recently and comprehensively, also it becomes the additional collections in enriching the treasury of interpretation.

E. Definition of Terms

1. Solar

A planet that serves as the center of the solar system[20], the solar have real light and so much benefits for life.

2. Circulation

Circulation comes from the word 'circulate' which means to surround something until it relies on the starting point, whereas the circulation is the movement around to get to the original place.[21]

3. Concept

In general, the concept is a general idea, design, but what the author means is the idea of a thought.[22]

4. On the Revolutions of the Heavenly Spheres

On the Revolutions of the Heavenly Spheres is a name of one of the books written by Fakhr al-Dīn al-Rāzi.[23]

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[20] Budi Prawoto, *"Serba-serbi Tata Surya"*, (Yogyakarta: CV Empat Pilar Pendidikan, 2014), p. 28

[21] Ibid, p. 40

[22] Pius A. Partanto, *Kamus Ilmiah Populer*, (Surabaya: Arkola, 2011), p. 23

[23] Fakhr al-Din al-Razi, *al-Mutasyahidu bi al-tafsiri al-kabir wa Mafatih al-Ghaib*, 1st Chapter, (Beirut: Dar al-Fikri, 1981), p. 4.

5. *Mafātiḥ al-Ghayb*

Mafātiḥ al-Ghayb is a name of one of the Tafsir books which is included in the category of ilmi interpretation books written by Fakhr al-Dīn al-Rāzi.[24]

6. *Tafsir*

Tafsir is a description that explains the word of Allah SWT in order to be easily understood, so that human beings can respond by using their reasoning to reveal divine values or divine messages that contained Qur'an.[25]

7. Book

Book is the same as usually the book, but in this context what the author means is a book that explains the explanation of interpretation of Qur'an.[26]

F. The Research Method

1. Type of research and approach

a. Library Research Method

This research uses type of library research that is the research activities which related to library data collection methods, reading and taking notes and processing the research materials and limiting to the

[24] Fakhr al-Din al-Razi, *al-Mutasyahidu bi al-tafsiri al-kabir wa Mafatih al-Ghaib*, 1st Chapter, (Beirut: Dar al-Fikri, 1981), p. 4.
[25] Manna' Khalil al-Qattan, *Studi Ilmu-Ilmu Qur'an*, translated by Mudzakkir (Bogor: Pustaka Litera Antar Nusa, 1992), p. 452.
[26] Prius A. Partanto, *Kamus Pintar Ilmiah*….op.Cit, p. 21.

library collection materials such as books, interpretation books, thesis, journals, articles etc. and without doing any research in the field.[27]

b. *Adaby* and historical approach

This research uses *adaby* or literature. When discussing about literature interpretation (*al-tafsir al-adaby*), it may not denying a concept of other sides of *i'jaz Qur'an*, how the relation between literature of Arab in one side is, and *i'jaz Qur'an* in one side, then the mastery of Arabic literature (*balaghah*) with its all *uslub,* it does not only help to understand the miracle aspects of *Qur'an* literature, but also to help to reveal its meanings and secrets beyond.[28]

The terminology often used in examining Qur'an to relate the aspects of miracle of Qur'an from its language is *al-I'jaz al-Bayāni* that is the understanding of *al-I'jaz al-Bayāni* includes letter and sentence in Al Qur'an seeing from *uslub* (style) side, clear (clarity), and balaghah (fluency/literature). These are the essence of *al-I'jaz al-Bayani.*[29] Therefore, by using literature approach will make the author easier to know *Fakhr al-Dīn al-Rāzi's* mean, especially when interpreting *Qur'an* exactly about sun, moreover there are 32 times ayah about sun in *Qur'an*.

While to analyze heliocentric theory of Nicolause, the author uses historical approach to describe all things which influence the

[27] Mestika Zeid, *Metode Penelitian Kepustakaan*, (Jakarta: Yayasan Obor Indonesia, 2004), p. 2-3.
[28] Supiana dan M. Karman, *Ulumul Qur'ab dan Pengenalan Metodogi Tafsir,* (Bandung: Pustaka Islamika, 2002), p. 61
[29] Ibid, p.74

construction of Nicolaus Copernicus' thought, such as the background of life, education, and environment then igniting that heliocentric theory, and the .

2. Resources and Data Collection Techniques

This research uses library research, so the data which is being studied only obtained from written data sources. The method for which data is used is documenter[30] method, namely the way of data collection by investigating the written materials related to the title of this research.

The data sources of this research are divided into two sources; those are primary and secondary research sources. The sources of primary data are On the Revolution of Heavenly Spheres book and 29th chapter of *Mafātiḥ al-Ghayb Tafsir* book by Fakhr al-Dīn al-Rāzi and others book. Then the secondary data sources are books, holy book, thesis, dissertation, journals, and also articles related to the solar circulation research, and also the works which discuss about Nicolause Copernicus and Fakhr al-Dīn al-Rāzi.

3. Data analysis

The researcher summarizes the data in a form that is easily understood and interpreted so that between the problems of research can be studied and tested. The data writing techniques used in this study is content analysis, namely a technical description that tries to describe the data being studied objectively and systematically. This is only analyzed

[30] Mundir, *Metode Penelitian Kualitatif dan Kuantitatif*, (Jember, Stain Jember, 2015), p. 186.

based on the data contents that have been collected, both primary and secondary data. Then author use the comparison technic to explain what the distinction between helioscemtrism theory of Nicolause Copernicus and Fakhr al-Dīn al-Rāzi's interpretation in *Mafātiḥ al-Ghayb Tafsir* book. Then use interpretation technic to explain more deeply the qur'anic interpretation that has been written by Fakhr al-Dīn al-Rāzi about the solar circulation verses.

This research tries to study a character by taking a certain theme, which is about the sun. In order the research objectives can be achieved optimally, and the data collection will be organized:

a. Explaining the solar circulation of heliocentric theory of Nicolause Copernicus, such as his back ground that influence to create this theory.
b. Collecting the verses about the solar circulation in Qur'an, identifying and classifying them into the respective verse categories, and then looking for the verses that have meaning and relevance to the Sun.
c. Explaining the results of Fakhr al-Dīn al-Rāzi's interpretation about the verses of lunar circulation in *Mafātiḥ al-Ghayb Tafsir* book and arranged in order to be more coherent so that the researcher will be able to determine the whole solar circulation concept according to Fakhr al-Dīn al-Rāzi.

d. Describing Nicolause Copernicus's theory and Fakhr al-Dīn al-Rāzi's interpretation, and also view of the solar circulation objectively.

4. Systematic of Writing

In this research writing system, it will be explained about the framework of writing that is used to facilitate in conducting research. Systematic of writing is as follows:

Chapter I: Introduction contains background, focus of study, research objectives, decision study, research method, and systematic of discussion.

Chapter II: Literature review, in this section will discuss about the general view of the solar circulation theory, the phases of the sun, other solar circulation theories that related to the solar circulation and eclipses. The focus of study also explains about the solar circulation theory that will be used to analyze the interpretation in the next chapter.

Chapter III: Containing the description about the biography of Nicolaus Copernicus and Fakhr al-Dīn al-Rāzi, their education, and the background of their thought. It aims to describe the background of the interpretation book and the author, so it will facilitate the process of further understanding in researching the science aspects, especially about the lunar circulation.

Chapter IV: This chapter containing the solar circulation concept according to Nicolaus Copernicus in On the Revolutions of the Heavenly Spheers Book, and Fakhr al-Dīn al-Rāzi in *Mafātiḥ al-Ghayb Tafsir* book,

and also describe both of author, because it is not only a description of interpretation book, but also includes factors influencing author's thought, methodology, tendency, systematic interpretation, and the views of other scholars about The Revolution of the Heavenly Spheres and *Mafātiḥ al-Ghayb*. Then focused on analyzing formulations of revealing the thought construct of Heliocentric theory and Fakhr al-Dīn al-Rāzi's interpretation of the solar circulation which performed in *Mafātiḥ al-Ghayb* book. This chapter is divided into several subs which contains the solar circulation in Qur'an that already interpreted in *Mafātiḥ al-Ghayb*. Then compere between heliocentric theory of Nicolause Copernicus and Fakhr al-Dīn al-Rāzi's interpretation of the solar circulation, and also continued with the interpretation of Fakhr al-Dīn al-Rāzi about verses that relate with the solar sirculation. The urgency and the relevance of Fakhr al-Dīn al-Rāzi's interpretation of the lunar circulation with heliocentric theory.

Chapter V: Closing, consisting of conclusions and suggestions.

CHAPTER II

CURRENT RESEARCH AND THEORITICAL FRAMEWORK

A. Previous Research

In this research, the author explains about the previous researches that relate with this research, so that it can be seen as long as the purity, position and research role which will be done. As for that research which will be used as benchmark comparison is a research that discusses about solar circulation, heliocentric theory, Nicolause Copernicus, Fakhr al-Dīn al-Rāzi, and also *Mafātiḥ al-Ghayb Tafsir* book.

Khoirun Nisa' from Faculty of Ushuluddin and Islam Understanding UIN Sunan Kalijaga[31] in her thesis entitled "*Peredaran Matahari: Studi Kasus atas Penafsiran Tanthawi Jauhari dalam Kitab Tafsir Al-Jawahir fi Tafsir Al-Qur'an Al-Karim*" explains that the sun is not only as the center circulation of the sky objects, but its functions is also as a stability to control the Earth rotation which means it is also to control the process of day and night shift, year and to control the others planet. The research result of astronauts finds the meeting point of the *kauniyah* verse in Qur'an after a long observation. This thesis tries to discuss about the interpretation which is done by Tanthawi Jauhari in *Al-Jawāhir fi Tafsīr Qur'an Al-Karim* book that specifically discusses about the solar circulation in Qur'an. Based on the result, it shows that the astronauts find the meeting point by using *kauniyah* verses in Qur'an after a long observation. Those

[31] Khoirun Nisa', *"Peredaran Matahari: Studi Kasus atas Penafsiran Tanthawi Jauhari dalam Kitab Tafsīr Al-Jawahir fi Tafsir Al-Qur'an Al-Karim*" Thesis of Faculty of Ushuluddin and Islamic Thought State Islamic University of Sunan Kalijaga, Yogyakarta, 2002

signs in Qur'an can be just understood as the scientific facts which have *i'jaz* characteristics after it's interpreted by using scientific equipment. How the sun circulates and submits to Allah in its orbital path, how the sun performs two movements, how the characteristic sun emits its own light and so on. This fact can only be understood after the scientific study is done by using modern methodology and scientific approach. Khoirun Nisa' uses Tanthawi Jauhari's understanding in *Al-Jawahir fi Tafsir Qur'an Al-Karim* book, as the main source of writing material of her thesis, because she thinks Tanthawi Al-Jauhari's interpretation as a physicist is helpful to understand the Qur'an by describing the kauniyah verses straightforwardly.

Syaifulloh Anwar from Faculty of Ushuluddin, UIN Sunan Kalijaga Yogyakarta, in his thesis entitled *Penafsiran Fakhr al-Dīn al-Rāzi terhadap Fitnah dalam Al-Qur'an (Studi Deskriptif Analisis Tafsīr Mafātih al-Ghayb)*, explains that this thesis aims to know the interpretation of slander in Qur'an according to Fakhr al-Dīn al-Rāzi's and its various kinds. Syaifulloh Anwar also explains that slander doesn't only mean as a test or a trial of life, but also he also explores it based on the verse context, so it gives other meanings such as shirk, *kufr*, sin, *adzab*, burn, misguidance, destruction, and so on. From here it can be seen the meaning of slander in Indonesian language does not same with the meaning slander in Qur'an.[32] In this case prove that there is *taraduf* in Qur'an,

[32] Syaifullah Anwar, *Penafsiran Fakhr al-Dīn al-Rāzi terhadap Fitnah dalam Al-Qur'an (Studi Deskriptif Analisis Tafsīr Mafātih al-Ghayb)*, (Thesis, Tafsir Hadits Program Faculty of Ushuluddin State Islamic University Sunan Kalijaga Yogyakarta, 2008

means that there is the similarity of the word but with different meaning, and there is different meaning but with the same word.

Nuramin from Faculty of Ushuluddin, Tafsir Hadits Department of UIN Gunung Jati Bandung,[33] has a thesis entitled "the Anthrophism in the Interpretation of *Mafātiḥ al-Ghayb* (Fakhr al-Dīn al-Rāzi creation)." This thesis explains about the understanding of Fakhr al-Dīn al-Rāzi about the anthrophism in *Mafātiḥ al-Ghayb* Tafsir book. Fakhr al-Dīn al-Rāzi in understanding the verse has the *tajsim* and *tashkish* connotation of Allah, he always understands it by using *takwil* or *majaz*. In this thesis Nuramin explain verses by verses clearly about Fakhr al-Dīn al-Rāzi's interpretation about anthrophism, and he explain that's verses about antrophism with similarity word that Fakhr al-Dīn al-Rāzi's interpreted and then he analyze based on his interpretation from Fakhr al-Dīn al-Rāzi's interpretation, in order to get clear and good research.

Djaya Cahyani from Faculty of Ushuluddin, Tafsir Hadits Study Program of UIN Syarif Hidayatullah Jakarta with the title "*Takdir dalam Pandangan Fakhr al-Dīn al-Rāzi*". In this thesis Djaya Cahyani explains that Fakhr al-Dīn al-Rāzi has considered that a destiny is a determination that has occurred and shown from the beginning of life time. Those events have been fixed and it is impossible to change. Human can't be said to have an absolute freedom because it always depends on external factors, especially for deity factors. Djaya Cahyani's thesis aims to know the views of Fakhr al-Dīn al-Rāzi indirectly about the destiny and

[33] Nuramin, "*Antromofisme dalam* Tafsīr Mafātiḥ al-Ghayb *(karya Fakhr al-Dīn al-Rāzi)"* (Thesis, Tafsir Hadits Program of Faculty of Ushuluddin State Islamic University Gunung Djati, Bandung, 2011)

the background of Fakhr al-Dīn al-Rāzi's interpretation based on his interpretation characteristic and his systematic writing of his book.[34]

Nur Azizah from Science of Qur'an and Interpretation Program of Faculty of Ushuluddin, Art and humanities of IAIN Jember, writes in her thesis *Peredaran Bulan dalam Qur'an* (research from Fakhr al-Dīn al-Rāzi consideration)." this thesis explains about disinterment of Fakhr al-Dīn al-Rāzi consideration in *Tafsīr Mafātiḥ al-Ghayb* about how lunar circulation in Qur'an.[35] Nur Azizah explain clearly about Fakhr al-Dīn al-Rāzi's biography and the systematic writing of Kitab Tafsīr Mafātiḥ al-Ghayb. And analyze deeply the verses of Quran that relate with the concept of lunar, such us about lunar circulation, the light of lunar, the function of lunar and so much more that already interpreted by Fakhr al-Dīn al-Rāzi in *Mafātiḥ al-Ghayb* Tafsīr Book.

H.Muhd. Sjomsoeri Joesoef from department of Islamic Religious Science , UIN Sunan Kalijaga Yogyakarta, has a dissertation entitled *Kitab Tafsīr Mafātiḥ al-Ghayb (Studi atas Pemikiran Fakhr al-Dīn al-Rāzi's tentang Nasakh Qur'an).* The dissertation which written by H.Muhd. Sjomsoeri Joesoef aims to explore Fakhr al-Dīn al-Rāzi's thought about the concept of *naskh* and the provision of Qur'an with all its problems, so that it can be known the existence of naskh in Qur'an according to Fakhr al-Dīn al-Rāzi's view, and there are also various factors which influencing his thought, and Fakhr al-Dīn al-Rāzi sees that the

[34] Djaya Cahyani, *Takdir dalam Pandangan Fakhr al-Dīn al-Rāzi,* (Thesis, Tafsir Hadits Program of Faculty of Ushuluddin State Islamic University of Syarif Hidayatullah Jakarta, 2011)

[35] Nur Azizah, *Peredaran Bulan dalam Qur'an,* (Telaah Tafsīr Mafātiḥ al-Ghayb), Faculty of Qur'an and Ushuluddin interpretation, art and humanities of IAIN Jember, 2017

naskh in Qur'an is *jaiz* in line with *madzhab mu'tazilah*, it is influenced by his strong education in the philosophy study.[36]

Ecep Ismail a lecturer of Sunan Gunung Djati university of Bandung,[37] in his journal *Kritik Metodologi Tafsīr (Studi al-Dākhil dalam Tafsīr Mafātiḥ al-Ghayb karya Fakhr al-Dīn al-Rāzi*, he criticizes about interpretation about *al-Dākhlil* that is Qur'an interpretation which does not have a clear basis of policy of the Quran interpretation. And what means Ecep Ismail al-Dākhil *naqli* here which bases on the history of *israiliyyat, hadits dhaif, hadits mauquf,* the compulsion of *kalām* consideration, *tasawuf* consideration, the compulsion of mind consideration and science approaching which exist in *Tafsīr Mafātiḥ al-Ghayb.* Al-Dakhil. And He explain that *al-Dākhlil naqli* is a very dangerous for Quran interpretation because it can make mufassir can't produce the objective interpretation.

Slamet Hambali from IAIN Walisongo Semarang,[38] he writing a journal entitled *Astronomi Islam dan Heliosentrime Nicolaus Copernicus.* In this journal he explained about Nicolaus Copernicus' biography, heliocentric theory, and verses of Quran that talking about everything that relate with heliocentric theory. Then, Slamet Hambali explain deeply the sign of verses that talking about scientific, he said that in the Qur'an there are some verses of earth, moon and sun, among others: Surat Yūnus: 5, al-Naml: 88, Yāsīn: 38, dan 40, al-Anbiyā': 33, Āli

[36] Muhd.Syamsoeri Joesoef, *Kitab Tafsīr Mafātiḥ al-Ghayb, (Studi Pemikiran Fakhr al-Dīn al-Rāzi tentang Nasakh al-Qur'an),* (Dissertation, Science of Islamic Religion State Islamic University of Sunan Kalijaga Yogyakarta, 2005)

[37] Ecep Ismail, *Kritik Metodologi Tafsir*, (Studi al-Dakhil dalam Tafsīr Mafātiḥ al-Ghayb karya Fakhr al-Dīn al-Rāzi)" State Islamic University of Sunan Gunung Djati Bandung, 2012

[38] Slamet Hambali, "*Astronomi Islam dan Teori Heliocentris Nicolaus Copernicu,* al-Ahkam Journal 23th Volume (Semarang: IAIN Walisongo, 2013), p. 229

‘Imrān: 190. He use Aḥmad Musṭafā al-Marāghī’s interpretation in book Tafsir al-Marāghī to analyze the that’s verses. Slamet Hambali assume that the Heliocentric theory was the one that in line with the Qur'an, and that the Heliocentric theory is a part of the miracle of the Qur'an, and he has proved the science truth which is brought by Qur’an. The Qur’an verse explicitly indicates that there is no contradiction with the modern science, especially regarding to the astronomy science of the sun by explaining the process of day and night shift, the ultimate motion of the sun, and the apparent motion of the sun.

There are many researches which concern on the lunar circulation and the moon occurrences concept. From the research result which conducted by Khoirun Nisa’ above, it can be seen that the verses tell about the circulation of the sun, and save many signs based on the scientific facts of modern science. In this study, it does not elaborate some specific scientific theories and there is no criticism of opposition theories, but it only presents the general theories of science. From the description above to the research of the solar circulation concept specifically of the science theory has never been done yet. Therefore the researcher assumes to examine it specifically and compare it with Fakhr al-Dīn al-Rāzi’s thought by taking one of the theories of science namely the Heliocentric theory pioneered by Nicolaus Copernicus.

B. Review of Theory: Typology of Science and Holy Book Relation.

In this thesis, the author takes a theory from Ian G Barbour who creates a concept that is the existence of a relation between the science and religion which is well-known as four typologies: relation between science and religion or holy

book. The author believes if holy book, specifically in this proposal writing is Qur'an which means there is a relation between science and Qur'an, even though Qur'an doesn't explain explicitly of sciences, but Qur'an explain much of realm and recommendation to always thinking about God's might. The four relation typologies between science and Qur'an explain as follows:[39]

First, the conflict typology, this typology considers if religion and science sometimes is contrast and has a conflict, and if it is linked with interpretation of Qur'an (*Tafsir Qur'an*), so this which has made almost commentators reject a variety of science interpretation, because if there is a theory of science which is not in line with Qur'an will create impulsion of interpretation and verification of interpretation, therefore in the future there will be *al-dākhil*[40] in the interpretation of *Qur'an.* This conflict typology involves between science materialism and biblical literalism. According to Barbour some historians show the evidence which is given by them is the selective and alternative perspectives about science relation and religion has been making attentively and widely for some centuries. Now, the popular view between science against religion is explicitly explained by media because the contra version between materialism of science and biblical of

[39] Ian G Barbour, *Religion an Age of Science*, (Harper: San Fransisco, 1990), p. 3

[40] *al-Dakhil:* according to the commentators have different meanings. According to the Khalifah Ibrahim defines *al-Dakhil* as the Qur'an interpretation which does not have a clear basis of Islamic syari'ah, whether it is Tafsir which uses narrations of hadist that are *dha'if* and *madhu* 'or that uses unhealthy reason (not fulfilling the requirements of *ijtihad* and *mufassir*). The word *al-Dakhil* in terms of *mufassir* is an interpretation that has no origins in the least with the shari'ah and resulted in the demage of understanding and content in the Qur'an. Al-Dakhil is a very fatal error, thus diverting the Qur'anic notion of the central theme of the teachings contained in Qur'an. Generally, *al-dakhil* is an interpretation deviation due to certain interests. Muhammad Ulinnuha, *Rekontruksi Metodologi Kritik Tafsir,* (Jakarta: Azzamedia, 2015) p. 76

science is more interested by society than moderates.[41] Besides, the theological spectrums are: naturalism (include materialism), pantheism, liberalism, neo-orthodox, traditionalism, conservatism, and biblical literalism (or fundamentalism). Barbour puts these two extremes in conflict relation of two views which apparently both are strange. And the reasons, science materialism and biblical literalism claim if the science and religion give a different statement in the same domain (history of nature) therefore people have to choose between the two. They believe if person can believe neither evolution nor God.[42]

Second, independence typology, in the first typology Barbour explains if sometimes between science and holy book have a conflict or contrast, and then, Barbour efforts to avoid it by separating these two surfaces into different area. Both can be differentiated based on problem analysis, referenced domain, and method used. Then, Barbour uses his analysis with ideology of existentialism method, neo-orthodox and ideology of analytic. Those are kind of clear differentiation, but generally they build independence and autonomy for these two surfaces. If there is law, science and religion surface there must be self-consider important and not taking involve of others. Every research method is selective and has own limitation.[43]

The separation area and its characteristic are kind of contradiction which is not only motivated by intention to avoid an unimportant conflict, but also an intention to confess the difference of character from each life and consideration.

[41] Waston, Hubungan Sains dan Agama: *Refleksi Filosofis atas Pemikiran Ian G. Barbour*, Profetika Journal, 23th Volume, (Ushuluddin Program Faculty of Islamic Religion of University of Muhammadiyah Surakarta, 2014), p. 79
[42] Ibid, p. 2.
[43] Ibid, p. 3-4.

And checking science and religion in the beginning as two separated domains then trying to analyze each language and function, which is significantly different. One of the ways to separate science and religion is interpreting science and religion as two unrelated languages because their different functions. Another hand, religion is also as human directive but science no. In philosophy era 1950, positive logical of social established a science statement as norm for all cognitive assertions and rejected any assertions which is not based on empirical verification and language analytical, as a respond, emphasizing this different languages also serves different function and do not need to reduce one and other. Science and religion work differently, therefore, one and other cannot value with their own standard. And especially scientific language has function to predict and control. Therefore a theory used to assemble data, find regularity in observed phenomena world, and product technology application. Besides, science also explores a limited problem about natural phenomena.

Barbour believes if independence is a good starter, therefore it maintains a unique character, either for religion or science which has many varieties. Also it becomes an accurate strategy to respond some classes who consider a conflict between the two are impossible to be avoided, because religion has different method, problem and function than science. But Barbour reminds if, we cannot be satisfied of an assertion if science and religion is two unrelated languages, it seems that these two different languages about the same world. If trying to search a coherent interpretation of all experience, we cannot attend from searching a solid world view. If science and religion are really independent, means that may

be avoiding a conflict can be done, but may also be a dialog constructive and enrichment between the two. Moreover we inspire the world is not for released part. We feel the life as a unity and relation even we create a different disciples to learn different aspects.[44]

Third, dialog type, this type creates closer relation between science and religion from conflict view and independence. But, dialog does not offer conceptual of unity like proponent of integration offer. Dialog may occur by considering pre-opinion in scientific effort, or exploring the series methods between science and religion or even analyzing concept in one surface with other surfaces concept. In comparing science and religion, dialog emphasizes the similarity of pre-opinion, method and concept. On the contrary, independence emphasizes those differences.

Four, Integration type, some authors proclaim the reformulation of traditional concepts theology is more extensive and systematic rather than the proponent of dialog doing. Hence, there are three different versions of in integration. In natural theology, there is a claim if the existence of God can be concluded from (or supported by) an evidence about the existence of entire world, which it makes us more believe in God's authority. In theology of nature, the main source of theology is at out of science, but the scientific theories can have a strong effect to the reformulation of some doctrines, especially about creating and human basis-characteristics.

[44] Ibid, p. 6-7.

The author thinks that type relation between science and religion of Barbour that suitable to be theory of this thesis is independence type, because when Nicolaus Copernicus show his experiment about solar, he considered apostate by the church leaders and considered insane by many scientists because he violates the church and science dogmas that think that the world as the center of universe, because the church's dogma still believe the Geocentric theory, that's why actually science and religion can't be same position, because religion is as human directive but science no.

The way to separate science and religion is interpreting science and religion as two unrelated languages because they really different functions. But the author believe that religion and science are not always have a conflict, because the religion being compass of human life that always depend with holy book that always talk about God existence, especially on this discussion is Qur'an. According to many verses in the holy Qur'an tell about that human should be thinking about the creature, how the world created, how the human and animals created and soon. It's never regardless from God's authority.

CHAPTER III

BIOGRAPHY OF NICOLAUS COPERNICUS AND FAKHR FAKHR AL-DĪN AL-RĀZI

A. Nicolaus Copernicus

1. Biography of Nicolaus Copernicus

Nicolaus Copernicus is a Polish astronomer, mathematician and economist, as proudly, he is also a church canon, judge, doctor, scientist, Catholic monk, governor, state official, military commander, astrologer and diploma. Nicoalaus Copernicus' real name is Niklas Koppernigk, whose Latin name is Nicolaus Copernicus and Polish name is Mikolaj Kopernik. He was born in Torun, on the bank of river Vistula Poland, on Friday (Java: Paing), February 19, 1473 AD, and died on Thursday (Java: Pon), May 24, 1543 AD.[45] Nicolause Copernicus came from a wealthy family. After graduating from his high school, he attended the University of Cracow and had a great interest in astronomy. In his twenties, he visited Italy, studied the medicine and law major at the Universities of Bologna and Padua who later got a doctorate in the ecclesiastical law from the University of Ferrara. Nicolaus Copernicus worked as a cathedral staff in Frauenburg, as a professional ecclesiologist, Nicolaus Copernicus had never become a professional astronomer, his big work which makes his name goes up is only owing to the odd jobs.[46]

During his time in Italy, Nicolaus Copernicus had known about the ideas of a Greek philosopher named Aristarchus from Samos in the 13th BC, and then

[45] Slamet Hambali, *Heliosentrisme dan Astronomi Islam*……. p. 227
[46] Nicolaus Copernicus, *Father of Modern Astronomy*, Blackbirch Inc. 2003. p. 2

he observed the stars and did it so carefully for some years, Nicolaus Copernicus wrote a controversial great book entitled: "De Revolutionibus Orbium Coelestium" which observed for years (the spherical revolution of celestial bodies).[47]

Nicolaus' education began in his hometown, but later he continued to the nearby of Chelmno. There, he studied Latin and observed the works of the ancient writers. When he was 18 years old, he moved to Krakow, the capital of Poland at that time. In that city he attended the university, taught and pursued his desire for astronomy. After he completed his education in Krakow, Nikolaus' uncle - who at that time had been a bishop in Warmia - asked him to move to Frombork, a city of the Baltic Sea, Waczenrode. He wanted his nephew to occupy a position of a cathedral staff.[48]

But the 23-year-old Nicolaus wanted to enrich his knowledge and persuaded his uncle to allow him to study a church law, medicine, and mathematics at the universities in Bologna and Padua, Italy. There, Nicolaus joined the astronomer Domenico Maria, Novara and philosophers Pietro Pomponazzi. Historian Stanislaw Brzostkiewicz said that the teachings of Pomponazzi had "liberated the mind of this young astronomer from the clutch of medieval ideology".

In his spare time, Copernicus studied the work of previous astronomers. He became so absorbed in that work until he knew that Latin work was incomplete.

[47] Michael H. Hart, *Seratus Tokoh yang paling Berpengaruh dalam Sejarah*, terj, H. Mahbub Djunaidi, cet. vii (Jakarta: Midas Surya Grafindo, 1986), p. 149.
[48] Nicholas Copernicus, *On the Revolutions of the Heavvenly Spheres*, (Canada: Pythagoras Publishing, 1543), p. 3

He studied Greek in order to be able to study the original script. At the end of his education, Nicolaus had become a doctor of law church, mathematician, and doctor. He was also an expert on Greek, and becoming the first person who translated directly a document from Greek to Polish.

a. Creating a revolutionary theory
b. Manuscript controversy
c. About revolutionary works

Copernicus is not the first person who concludes that the earth revolves around the sun. Greek astronomer Aristarchus from Samos has proposed this theory in the third century BC. The followers of Pythagoras have taught that the earth and the sun move around to a central fire. However, Ptolemeus writes that if the earth moves, "Animals and other things will hang in the air, and the earth will fall out of the sky very quickly," he adds, "Just thinking about those things is ridiculous."

2. The History of Heliocentric Theory

The first universe observation was conducted by Aristarchus from Samod in. He tried to calculate the angle between the location of the Sun, the Earth, and the Moon and to find a comparison of the distance between the Earth to the Sun, Earth to the Moon. Likewise Aristarchus is the one who assumes that the Earth moves around the Sun in a circular trajectory which becomes the starting point of the Heliocentric theory. Thus, the Heliocentric theory has already been believed by the philosophers and astronomers before it was declared by Nicolaus Copernicus. Aristarchus theory gained a resistance from Geocentrism theory of

Hipparchus which states that all objects (stars, planets, and sun) move relatively surrounding the earth in which accepted as the basis of the geocentric model (the earth as the solar system). The apparent motions of the relative planets, moon, and sun to the stars and each other are described almost completely in Geocentrism theory of Hipparchus in about 140 BC. Furthermore, that theory was developed by Claudius Ptolemaeus (Ptolemy) circa 150 BC which commonly called Ptolemaic.[49]

In Ptolemaic theory, the earth's position is in the center of the universe. The moon revolves to the earth by its closest orbit, while the stars lie on the large rounded spinning celestial spheres in farthest orbit in which the moon and stars are located in the sun's orbit. At that time, Geocentrism theory was believed by experts for almost 1400 years, but the main difficulty in geocentric models is the periodic retrogression of the planets, and its weakness is the sun and moon move in the circle traces around the earth, while the planets do not move regularly in vertices series to the east. The relative apparent path of the planet to the stars throughout the year becomes the uneven curve, even the planets are observed to reverse backward (moving backward before moving forward again during the year.) To explain this pseudo-backward motion inside the Geocentrism theory framework, it needs to assume that planets move in small circular trajectories called epicycles, when planets follow a large orbit around the earth.[50]

Finally, in 1543 the Geocentrism theory was fallen by a great revolution of Nicolaus Copernicus (1473-1543) that justifies the concept of Aristarchus replacing the geocentric model with a simpler and more rational of heliocentric

[49] Prof Dr. H. Bayong Tjasyono HK., DEA, *Ilmu Kebumian dan Antariksa*, Cetakan ke-6, (Bandung: PT. Remaja Rosdakarya, 2013), p.19
[50] Ibid, *Ilmu Kebumian dan Antariksa*…….p. 20

model. The planets between the sun and the star revolved to the sun in a circular orbit. The heliocentric view was actually expelled by Aristarchus, a Greek astronomer in the 13th century (about 310-230 BC). [51]Aristarchus described that the earth and planets revolved to the sun, but at that time Aristarchus' opinion was only a hypothesis, it's not written in papers, moreover at the time Aristarchus' opinion was inconsistent with Aristotle's opinion (384 BC-322 BC), so the Heliocentric theory of Aristarchus was marginalized by Geocentrism theory. But in society's world, Aristarchus is not really well known by many people in this view. Because he is lack of getting support at the time, this theory was closed by Aristotle's famous advancement. Nicolas Copernicus precisely holds a great worldwide reputation since the enlightenment era (Renaissance) until this modern time. This theory gets many various challenges. So, Copernicus is considered apostate by the church leaders and considered insane by many scientists because he violates the church and science dogmas.[52]

After Copernicus's death, the view of the church changed when at the end of the 16th century the Italian philosopher, Giordano Bruno states that all stars to be similar to the Sun and each planet had its planetary system which inhabited by different kinds of people. This view caused Giordano Bruno to be burned. Heliocentric theory has deviated from the doctrines and dogmas of the church and also considered dangerous because it contradicts to the view of the church that considers man to be central in the universe. Although Copernicus has published his writings on Heliocentric Theory, and no one agrees with it.

[51] Ibid, p. 20
[52] Andi hakin Nasution, *Pengantar ke Filsafat Sains,* (Jakarta: Pustaka Litera Antarnusa, 1989), p. 129

The application of Heliocentric theory can be directly applied in the making of the Christian calendar (sun calendar) which we use today, the solar calendar is made based on the basis of earth calculations evolved around the sun. Indirectly also heliocentric theory used in the development of some things as follows:

The beginning of the telescope use was in 1608. This telescope was made by Galileo Galilei (1562-1642), Galileo was a mathematics professor at Pisa who was interested in mechanics particularly about the planetary motion. He was the one who was interested in Kepler's publications and convinced of the heliocentric theory. With his telescope, Galileo succeed to find the Galilean satellites in Jupiter and became the first one who sees the existence of the rings on Saturn. One of the most important observations which convinced him about the heliocentric theory was the Venus phase problem. Based on geocentric theory, Ptolemy states that Venus is close to the point between the sun and the earth, so the observer from the earth can only see Venus during a crescent phase. But based on a heliocentric theory supported by observations from Galileo, all Venus phases can be seen even discovered. The Venus disk angle is greater than the full moon at the crescent phase. Galileo's publication of his thoughts on the theory of geocentric vs. heliocentric, Dialogue of the Two Chief World System, caused him to be under house arrest and considered a disagreement by the church.

The basis laid by Newton in the year of Galileo's death, Isaac Newton (1642-1727) was born. It could be said that Newton provided the basis for his work and the people before him, especially concerning to the origin of the Solar System. He composed Newton's Law of Motion and his greatest contribution in

Astronomy is the Law of Gravitation which proves that the force between two objects is proportional to the mass of each object and inversely proportional to the square of the distance between the two objects. Newton's Gravity Law provides a physical explanation for Kepler's Law which was found earlier based on observations. The results of his work were published in Principia which he wrote for 15 years. Newton's theory became the basis for various theories of the formation of the Solar System which was then born, until 1960 including monistic theory and dualistic theory. Monistic theory states that the sun and planets come from the same material. While the dualistic theory states the sun and the earth come from different material sources and are formed at different times.

This theory assumes that the sun is as the center of the planets circulation, including the earth. While the moon surrounds the earth simultaneously then the earth revolves to the sun. But the sun is just spinning on its axis. There are nine planets that we know in our solar system namely: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune and Pluto, all of them revolve to the sun. For Pluto, it is disputed whether it belongs to the planets in our solar system or not.

Heliocentric Theory of Nicolaus Copernicus also received great attention from later philosophers. After long and profound observations and research, they justify, support and refine Heliocentric theory of Nicolas Copernicus. Among them are Isaac Newton (1642-1727 AD), Galileo Galilei (1564-1642 AD) and Johannes Kepler (1571-1630 AD). Nicolaus Copernicus is applauded by many people and nicknamed as a father of modern astronomy, even an astrophysicist Owen Gingerich stated that, "Copernicus's work shows us how fragile the accepted scientific concept which has been received for a long time." Through

observation, research, and mathematics, Copernicus reversed a strong but erroneous scientific and religious concept. In human thought, he also stops the sun and moves the earth.

B. Fakhr al-Dīn al-Rāzi and *Mafātiḥ al-Ghayb Tafsir* Book

1. Biography of Fakhr al-Dīn al-Rāzi

The full name is Abu ‘Abd Allah Muhammad bin Umar bin Al-Husayn bin al-Hasan bin ‘Ali at-Tamimi al-Bakri al-Thabrasani al-Rāzi. His degree is Fakhr al-Dīn, also known as Ibn al-Khotib[53] and Syaikh al-Islam. Al-Rāzi was born in 25 Ramadhan 544 H[3] / 1149 AD in Ray City which exactly in a famous city in Dailam country near the city of Khurasan, west of Tehran and the capital of Iran, with the nickname Fakhr al-Dīn al-Rāzi[4]. According to Manna’ Khālil al-Qatthan, Fakhr al-Dīn al-Rāzi was born in 543 H[5], and Fakhr al-Dīn al-Rāzi’s full name is Abu ‘Abd Allah Muhammad bin Umar bin Al-Husayn bin al-Hasan bin ‘Ali at-Tamimi al-Bakri al-Thabrasani Fakhr al-Dīn al-Rāzi. He has a degree that is Fakr al-Dīn. His famous name is Ibn Khātib al-Syafi’i[54].

Fakhr al-Dīn al-Rāzi was born in Ray City, on 25 Ramadhan 543 H. Coinciding with the year 1149 AD, and he died in the Herat (Ray) area on Monday night, the day of Eid Al-Fitr, 606 H/1209 AD at the age 63 years old.[55] He was a great scholar who lived in the northern Persian region, which at that time was under the authority of *Khawarizm Syahiyah* sultanate and partly under Guriyah sultanate. He had a discussion or debate with the Mu'tazila people in

[53] Muhammad Husain al-Dzahabi, *al-Tafsir wa al-Mufassirun*, vol 1 (Kaherah: Maktabah Wahbah, t.t), p. 206.
[54] Ibid, vol I, p. 290.
[55] Fakruddin al-Razi, *Tafsir Mafatih al-Gaib*, (Beirut: Dar al-Fikr, 1414 H / 1994 M), in Muqadimah vol I, p. v. 1 see also ‘Ali Hasan al-‘Aridl, Sejarah...op. cit ., p. 31.

defending *aqidah Ahlu al-Sunnah wa al-Jamā'ah* (especially Asy'āriyah) and *Madzhab fiqh* which he followed.[56]

Fakhr al-Dīn al-Rāzi lived in a family of scientists. His father Diyā' al-Dīn 'Umar was a well-known scholar and a preacher in Ray mosque. Toward his adult, Fakhr al-Dīn al-Rāzi often migrated to some famous places like Transoxania, Khawarizmi, Khurasan, Samarkand, Ghaznah and India and the continent behind the river to conduct some various scientific activities and he also preached through discussions and debates which aimed to seek the protection. It was not surprising if Fakhr al-Dīn al-Rāzi had much interaction with the royal officials.[57]

During his lifetime, Fakhr al-Dīn al-Rāzi had a relationship with two kings of Ghauri; they were Gyas al-Dīn and Syihāb al-Dīn. Then he made a good relationship with 'Alau al-Dīn Taksy who also known as Khawarizmsyah in Khurasan. Fakhr al-Dīn al-Rāzi worked for him as his son's teacher *(*Muhammad ibn Tasky*)*. In addition he was also close and having cooperation with Auhad Najm al-Din Ayyub ibn al-Malik al-Adil Abi Bakar ibn Ayyub. For him, Fakhr al-Dīn al-Rāzi wrote a book entitled *Ta'sis al-Taqdis* which then changed into *Asas al-Taqdis*. The last Fakhr al-Dīn al-Rāzi had a good relation with *Bisam ibn Muhammad Hakim Bamyan*. For him, Fakhr al-Dīn al-Rāzi wrote a book entitled al-*Barahin al-Bahaiyah* in 602 H. From there, Fakhr al-Dīn al-Rāzi's status had increased greatly after previously he appeared as a person who "less able in economic terms".[58]

[56] Harun Nasution (dkk), *Ensiklopedi Islam Indonesia*, (Jakarta: Djambatan, 1992), p.809.
[57] Ibid, p. 810
[58] Fakhr a-Din al-Razi, *Tafsir Mafatih al-Gaib*, op. Cit, p. 1

Fakhr al-Dīn al-Rāzi has three sons and two daughters, one of his sons named *Muhammad* died at the young age. Fakhr al-Dīn al-Rāzi's first son named 'Abdullah with the title *Diyā' al-Dīn*, while the last son has the title *Syam al-Dīn* which after Fakhr al-Dīn al-Rāzi died, he was nicknamed by the name of his father. One of Fakhr al-Dīn al-Rāzi's daughters became a wife of Minister *'Alau al-Malik*, Minister *Khawarizmsyah Jalal al-Din* Taks *Muhammad* Taks. Both sons of Fakhr al-Dīn al-Rāzi were married to both daughters of a wealthy doctor when they met in *Khawarij*. Fakhr al-Dīn al-Rāzi most famous work is *Tafsīr al-Kābir* book or *Mafātiḥ al-Ghayb*. That book consists of 32 large volumes; each volume contains more than 300 pages.[59]

During his lifetime, there are many works which Fakhr al-Dīn al-Rāzi has written in various disciplines. Sayyid Ḥusain Nasr replies al-Bagdādi who divides Fakhr al-Dīn al-Rāzi's work into various disciplines namely: (1) *Tafsīr*; (2) *Kalām* Science; (3) Logic, philosophy and ethics; (4) The combination of theology and philosophy; (5) The science of *fiqh* and science of *ushūl fiqh*; (6) *Syarah* and biography of the people (7) Mathematics and astronomy; (8) Health sciences and physiognomy (*al-Tibb wa al-Firāsah*); (9) Magical and astrological; and (10) Public works and encyclopedias.[60]

The books of Fakhr al-Dīn al-Rāzi in detail are as follows:[61]

a. Tafsīr

1) Tafsīr al-Qur'ān al-Kabir or Tafsīr Mafātiḥ al-Ghayb.

[59] Muhammad Husain al-Dzahabi, loc. Cit. p. 291
[60] Saiful Amir Ghofur, Mozaik Mufassir al-Qur'an dari Klasik Hingga Kontemporer, (Yogyakarta: Kaukaba Dipantara, 2013). P. 74
[61] Nur Azizah, *Peredaran*…. loc. Cit, p. 43

2) Book of Tafsīr al-Fātiḥaḥ, which is now becoming the first volume of Tafsīr Mafātiḥ al-Ghayb.
3) Book of Tafsīr Surah al-Baqarah, it is also included in one volume, but now it has its own printing
4) Tafsīr al-Qur'ān al- Saghīr also known as Asrar al-Ta'wīl wa al-Anwār al-Tanzīl, the last name is similar to the interpretation work of al-Baydawi.
5) Book of Tafsīr asma' Allah al- Ḥusna'.
6) Book of al-Ayāt al-Bayyināt.
7) Risālah fi al-Tanbīh 'Ala ba'di Asrār al-Mau'iddah fi al-Qur'an.

This book is a composite of *kalām* interpretation by *Sufi's* ideas about metaphysics which are based on surah *al-Ikhlās*, the prediction is based on surah *al-A'lā*, the revival is based on surah *at-Tīn*. The recording of human work is based on surah *al-'Asr*.

b. Theological Work
1) Muhassal Afkār al-Mutaqaddimīn wa al-Mutaakhirīn min al-'Ulamā' wa al-Hukamā' al-Mutakallimī.
2) Al-Ma'ālim fi Ushūl al-Dīn.
3) Tanbīh al-Isyārat fi Ushūl al-Dīn.
4) Book of al-Arba'in fi Ushūl al-Dīn.
5) Book of Subdat al-Afkār wa Umdat al-Nuzzar.
6) Book of Principal al-Taqdīs.
7) Book of Tahdīb al-Dalā'il wa 'Uyūn al-Masā'il.
8) Mabāḥis al-Wujūd wa al-Adām.

9) Book of answer al-Gaylani.
10) Lawāmi' al-Bayyināt fi Syarḥ Asmā' Allah wa al-Sifāt.
11) Book of al-Qadā' wa al-Qadar.
12) Book of al-Khalq wa al- Ba'as.
13) Masā'il Khamsun fi Ushūl al-Dīn (written in Persian).
14) Book of 'Ismat al-Anbiyā'.
15) Book of al-Riyādh al-Mu'miqāt fi Milāl wa al-Nihāl.
16) Book of al-Bayān wa al-Burhān fi al al-Radd 'ala Ahl al-Zaiq wa al-Tughyān.
17) Book of Irsyād al-Nuzzar Ila lasta'if al-Asrār.
18) I'tiqadāt Farq al-Muslīm wa al- Musyrikīn (a comparative study of religion).
19) Risālah fi al-Nubuwwah.
20) Book of Syarh al-Wājiz li al-Ghazāli. Fakhr al-Dīn al-Rāzi doesn't complete this work but he writes it up to three volumes of worship and marriage

c. Fiqh
   a. Book of al- Mahsul fi' Ilm Ushūl al-Fiqh.
   b. Book of al-Ma'ālim fi Ushūl al-Fiqh.
   c. Al-Kitāb Iḫkām Aḫkām.

d. History
   1) Book of Munāqib al-Imām al-A'zam al-Syāfi'i.
   2) Book of Fadhā'il al-Shaḫābah al-Rāsyidīn.

e. Linguistics and Rhetoric

1) Book of al-Muhassal fi Syarh al-Kitāb al-Mufassal li al-Zamakhsyari.
2) Book of Syarh Nahj al-Balaghah.
3) Niḫāyat al-I'jāz fi Dāriyah al-I'jāz. (fi 'ulum al-Balaghah Bayān I'jāz al-Qur'ān al-Syarīf).

f. Sufism and General science

1) Book of al-Risālah al-Kamāliyah fi al-Haqāiq al-Ilāhiyyah.
2) Risālah Naftat al-Mashādir.
3) Book of Risālah fi Ghamm al-Dunyā.
4) Risālah al-Majdiyyah.
5) Taḫsil al-Ḫaq.
6) Mabāḫis 'imādiyyah fi al-Mathālib al-Ma'tadiyyah.
7) Book of Lathāif al-Ghiyātiyah.
8) Sirāj al-Qulūb.
9) Ajwibuh al-Masā'il al-Tijāriyah.
10) Risālah al-Suḫibiyyah

g. Philosophy

1) Al-Mabāḫis al-Misrīqiyyah.
2) Book of Syarh 'uyūn al-Ḫikmah Li Ibn Sina.
3) Syarh Isyārah wa al-Tanbīhah Li Ibn Sina.
4) Book of Ḫibab al-Isyārah.
5) Nihāyah al-'uqūl.
6) Book of al-Mulākhash fi al-Ḫikmah.
7) Book of al-Tharīqah fi al-Jadal.
8) Book of al-Risālah fi al-Su'al.

9) Book of Muntakhab Tanha Lusha.
10) Mabāḥis al-Jaddal.
11) Book of al-Rariwah al-‘alaiyyah fi khilaf.
12) Book of fi Ibtal al-Qiyas.
13) Book of Risālah al-Qudūs.
14) Book of Tahjim Ta’jiz al-Falāsifah.
15) Al-Barāhim al-Bahāiyyah.
16) Book of Syifā’ al-Iyyah min al-Khilāf.
17) Al-Akhlāq (morals)
18) Al-Munāzarah.
19) Risālah al-Jauhar al-Fard.
20) Syarh Musādirah Iqlidis.
21) Book of Syarh Siqt al-Zarid li al-Ma’āri.

h. Exact science

1) Book of Syarh Kuliyyah al-Qanūn.
2) Al-Jāmi’ al-Kabīr al-Māliki fi al-Tib.
3) Jāmi’ al-‘Ulūm.
4) Book of Sir al-Maktūm.
5) Book of al-Nabad.
6) Lubub fi al-Handasah.
7) Book of al-Iktiyārah al-‘alaiyyah fi al-Tatirah al-Samāwiyyah (astrology).
8) Risālah fi al-Nafs.
9) ‘Ilm al-Firāsah.

10) Book of fī al-Raml.

11) Tashrih min al-Rā'is Ilā al-Ḥaq.

2. Social-political conditions and Fakhr al-Dīn al-Rāzi's scientific activities

Fakhr al-Dīn al-Rāzi lived during the reign of *Bani Abbasiyah* which reflected a glory phase of Islam or a golden age of the science. Politically, the caliphs were truly the powerful figures and also as the center of political and religious authority. On the other hand, the prosperity of the people reached the highest level.[62] This mid-period was marked by the development of discussions in all branches of science. The official attention and support of the government in this case became a very significant trigger for the science development. *Daulah Abbasiyah* (the dominant government at that time) was very concerned with the human civilization development, such as the translation of scientific books or by opening the scientific forums.[63]

The medieval interpretation was full of the subjective (ideology) "interests" of its interpreters. Each of them were looking for the public and governmental support through a truth claim and showing the truth by seeking the justification from Qur'an.[64]

In this mid-period there was also a certain fanaticism in the branches of several sciences. With this fanaticism, a *taqlīd* tendency was born to eliminate a tolerance and way of thinking of certain generations. Fanaticism was more

[62] Nur Azizah, *Peredaran*..., op. Cit., p. 50.

[63] It is often in the interdisciplinary dialogue forum ends by discriminating each other. The most popular example of this debate is between religious studies (Mutakallimin) with the Greek philosophers or logicians, among kalam experts with hadith experts, also among kalam experts with hadith experts and many more. See Abdul Mustaqim, Mazdhabut Tafsir: Peta Metodologi Penafsiran al-Qur'an Periode Klasik hingga Kotemporer, Cet. I. (Yogyaarta: Nun pustaka, 2003), p. 68.

[64] Ibid..

exciting when it came into politics, where certain groups were often used to back up the power or be used as a political tool. In that era, politics and religion are difficult to be separated because all of those were done to seek the public relations.[65]

With this social-political background, Fakhr al-Dīn al-Rāzi's interpretation was influenced by this condition, *aqliah* sciences dominated Fakhr al-Dīn al-Rāzi's thought in his interpretation, he combined various studies of medicine, logic, philosophy and wisdom. This caused his interpretation was out from the meanings of the Qur'an and its verses. It brought the passages of the book to the problems of *aqliah* science and scientific terminology. Therefore, this interpretation had no *ruḥaniyah* explanation and Islamic guidance, until some scholars said, "There is everything on it besides the interpretation itself."[66]

Fakhr al-Dīn al-Rāzi's education began when he studied directly to his father Dhiyā' al-Dīn 'Umar Ibn Ḥusain, one of the *madzhab* scholars of Asy'āri in Kalām, and a madzab scholar of Syāfi'i in fiqh. The education from his father produced Fakhr al-Dīn al-Rāzi's real ability in mastering the knowledge which can be seen from his memorization of al-Syāmil Ushūl al-Dīn book by Imām al-Ḥarāmain about Kalām science, al-Mustasyfa by Imam Abi Hamid al-Gazali about Ushul Fiqh and al-Mu'tamad by Abu Ḥusain al-Bashri about Ushūl Fiqh. The influence of his father also appears from Fakhr al-Dīn al-Rāzi's choice of *madzhab* which has no different from his father.[67] After Fakhr al-Dīn al-Rāzi's

[65] Ibid, p.71-72
[66] Manna' Khalil al-Qattan, Studi...,op. Cit., p. 529
[67] M. Salih al-Zarkn, *Fakhr al-Din al-Razi Arauh al-Kalamiyah wa al-falsafiyah*, (Beirut: Dar al-Fukr, t.t), p. 17.

father died, he continued his studies by deepening knowledge from other prominent scholars. He also studied theology and philosophy at al-Majd al-Dīn al-Jili, al-Simāni, al-Baghāwi, and became a teacher of other great thinkers including al-Suhrawardi.[68]

3. Methods and styles of interpretation

Tafsīr Mafātiḥ al-Ghayb consists of 32 large volumes of interpretation. However, some opinions show that Fakhr al-Dīn al-Rāzi does not have a time to finish it. Those opinions also disagree on how far he finished his interpretation and who completed it.[69]

The interpretation method which Fakhr al-Dīn al-Rāzi uses is *Tahlily* method (analytical). It means the commentators describe the meaning contained in Qur'an, verse by verse and surah by surah based on the orders in *Mushaf*, starting from surah al-Fatihah to surah an-Nas.

Tafsīr Mafātiḥ al-Ghayb or *Tafsīr al-Kabīr* use *bi al-ra'yi* interpretation form (interpreting Qur'an based on an opinion or reason), or in other words the interpretation of Qur'an itself tries to understand about Arabic language, *asbab al-nuzul, nasikh mansukh*, and other matters required by the conventional interpreters. This interpretation is theological (*al-I'tiqadi*).

[68] Harun Nasution(dkk.), *Ensiklopedia Islam Indonesia*.... Op. Cit, p. 809.

[69] Regarding to this, Syaikh Muhammad al-Zahabi gives the following note: what I can say as a solution to this crossed opinion is Iman Fakhruddin has completed his interpretation up to surah al-Anbiya'. Furthermore, shihabuddin al-Khaubi completes the deficiencies but he also cannot finish them thoroughly. And after that Najmuddin al-qamuli finished the rest of it. But it can also be said that al-Khaubi has completed it to completion, meanwhile al-Qamuli writes another refinement, not that al-khaubi has written. Manna' Khalil al-Qattan, studi...,op. cit., p. 506-507

Regarding *to tafsīr bi al-Ra'yi*, some scholars have some different opinions. Several scholars prohibit it and the rest of them allow it. The difference is caused by the interpreter uses it based on the opinion (*ra'yu*) "Allah intends to do this and so" without accompanied by *dalīl* and *hujjah* or because people try to interpret Qur'an when they are not be able to control the rules of Arabic language and the principal points of religious law, or because they are driven by their passions to twist the wrong meaning of Qur'an verses. Another case, if an interpreter has sufficient requirements to interpret, it will not be wrong if they try to interpret Qur'an by using their basic opinion and reason. Qur'an itself suggests that the people who do *ijtihad* should think of every verse of Qur'an and they also need to deepen their knowledge of the teachings.[70]

This *Tafsir bi al-Ra'yi* is acceptable as long as its interpretation has fulfilled some good requirements, and as long as doing the interpretation, they should avoid these following five points:

a. Staying away from being too suspicious to God's will in His Word, without any requirement as an interpreter.
b. Imposing themselves to understand something which is only God who knows it
c. Avoiding the encouragement and passionate interests.
d. Avoiding the interpretation which only written for some particular interests of *madzhab*, then that *madzhab* is used as the second and basic point of interpretation which resulting various errors.

[70] Saiful Amir Ghofur, *Mozaik*….. op. Cit, *75*

e. Avoiding a definite interpretation *(qath'i)*, in which an interpreter, without reason, claims that it is only God's purpose.

Fakhr al-Dīn al-Rāzi uses the way of theology philosophers (theology) in proposing the theorems, it's based on the science of *kalām* semantics (logic). He pays special attention to the universe phenomenon and divides some related verses into a number of issues, then continued his interpretation by defending *madzhab ahlu al-Sunnah wa al-Jamā'ah*.[71]

4. Book of *Tafsīr Mafātiḥ al-Ghayb* Book

a. The Interpretation Method and Style of *Tafsīr Mafātiḥ al-Ghayb*

One of the monumental works of Fakhr al-Dīn al-Rāzi is *Tafsīr Mafātiḥ al-Ghayb* which used as the main reference in some interpretation works of scholars and thinkers ranging from the classical, modern to contemporary era. Fakhr al-Dīn al-Rāzi is *Tafsir*'s work is categorized as *tahlily* interpretation method, because in interpreting *Qur'an* he starts it from surah *al-fātihah* to *al-Nās*. The approach form of his interpretation is bi *al-ra'yi*, because it is dominated by *aqliyah* sciences, whereas the style used by Fakhr al-Dīn al-Rāzi is '*ilmi*. Besides, there are other styles which present many disciplines such as physics, astronomy, philosophy, *kalām*, etc. which developed at that time.

The characteristics of Fakhr al-Dīn al-Rāzi's interpretation in *Mafātiḥ al-Ghayb* book are:

a) In interpreting, Fakhr al-Dīn al-Rāzi reveals the problems and questions and answers. Then he clarifies and discusses them with several propositions based on his own thoughts from the

[71] Saiful Amir Ghofur, *Mozaik*….. op. Cit, *75*

knowledge he mastered and the opinions from the predecessors such as Ibn al-Abbās, Ibn al-kalb, mujāhid, Qatādah, al-sa'di, Muqātil bin sulaiman al-maruzi, abu ishāq, al-Tsa'labi, ibnu Qutaibah, Muḥammad bin jarir al-Thabari, etc. Linguistically it is quoted from Abi 'ubaidah, 'Ulamā' Farāh', Zujāj and Mubarrad. While the source is taken from *Mu'tazilah* scholars such as *Abu* Muslim al-Ashfahani al-Qadli 'abdul Jabbār, and Zamakhsyari.[72] Fakhr al-Dīn al-Rāzi doesn't take any kind of Prophet's hadiths, so for the *fiqh* problem he instead uses more opinions of *fiqh* scientists.

b) In explaining *aḥkām* verses, Fakhr al-Dīn al-Rāzi tends to present *madzhab al-syāfi'iyah*, especially in the matters of worship and *mu'āmalah*.[73]

c) In interpreting *kalām* problems, Fakhr al-Dīn al-Rāzi tends to defend al-Asy'āriyah theology (*ahlu al-Summah wa al-Jamā'ah*).

d) Fakhr al-Dīn al-Rāzi generally uses a philosophical approach in his interpretation, and reveals the secrets of the verse by using the depth and exact science approach.[74]

e) Seeing from the chronology, Fakhr al-Dīn al-Rāzi used *munāsabah*[75] method because there are many correlations between the verses and surah. This means that what's in *Qur'an* is clear,

[72] Fakr al-Din al-Razi, *Tafsir Mafatih al-Ghaib*, Vol 1, 9
[73] Mani' Abdul Halim Mahmud, *Manahij al-Mufassirin* (Beirut: Dar al-Kitab li al-Bayan), p. 148
[74] Yuyun Zunairoh, *Penafsiran al-Qur'an dengan Filsafat: Telaah Kitab Mafātiḥ al-Ghaib Fakhr al-Dīn al-Rāzi*, Jurnal Emprisma, Vol. 24 No. 1 (Januari, 2015), 127-128
[75] Munāsabah is the correlation between one verse and another verses, one surah and another surah

both the wisdom, the orders of secret and *asbab al-nuzul*.[76]

Munāsabah which Fakhr al-Dīn al-Rāzi applied in another interpretation form is between the verses and other related verses, also the verses which have been separated with others, and etc.

f) Fakhr al-Dīn al-Rāzi often presents *syi'ir* to solve *balaghah* problems by using the knowledge he mastered and in accordance with his ability in linguistic field.

b. The Systematic of Book Interpretation

The book of *Mafātiḥ al-Ghayb* consists of thirty-two volumes detailing the contents of surah in each volume as follows:

Table 1.1

The systematic of interpretation

Volume	Name of Surah	Number of pages
1	Al-Fātiḥaḥ: 1-7	297
2	Al- Baqarah:1-34	265
3	Al- Baqarah:35-109	275
4	Al- Baqarah:110-167	239
5	Al- Baqarah:168-210	239
6	Al- Baqarah:211-254	266
7	Al- Baqarah:255-286, Ali-'Imran:1-25	241
8	Ali-'Imran:26-129	244
9	Ali-'Imran:130-200, Al-Nisā': 1-16	247

[76] Manna' Khalil al-Qattan, *Mabāḥits fī 'Ulūm al-Qur'ān*, (Beirut: Dar al-'Ilm lil Malayin, 1997), p. 293

10	Al-Nisā':17-93	243
11	Al-Nisā':94-176, Al-Mā'idah :1-43	247
12	Al-Mā'idah:44-120, Al-An'ām:1-53	255
13	Al-An'ām: 54-152	251
14	Al-An'ām: 153-165, al-A'rāf :1-145	251
15	Al-A'rāf: 146-206, al-Anfāl:1-75, al-Taubah:1-13	248
16	Al-Taubah: 14-129	247
17	Yunus :1-109, Hūd 1-44	248
18	Hūd:45-123, Yusuf:1-111, al-Ra'd:1-2	243
19	Al-Ra'd:3-43, Ibrāhim : 1-52, Al-Ḥijr :1-99, Al-Naḥl:1-11	244
20	Al-Naḥl:12-128, Al-Isrā' :1-60	243
21	Al-Isrā':61-111, Al-Kahfi:1-110, Maryam:1-98	259
22	Thāha :1-135, Al-Anbiyā':1-112	240
23	Al-Hajj:1-78, Al-mu'minūn:1-118, Al-Nūr:1-35	249
24	Al-Nūr:36-64, Al-Furqān : 1-77, Al-Syu'arā': 1-227, Al-Naml:1-93, Al-Qashah:1-55	272
25	Al-Qashah:56-88, Al-'Ankabut:1-69, al-Rum:1-60, Luqmān:1-34, Al-Sajdah: 1-30, Al-Aḥzāb:1-73, Saba':1-54	280
26	Fathīr:1-45, Al-Zumār:1-52	296
27	Al-Zumār:53-75, Al-Jātsiyah:1-37	279

28	Al-Aḥqāf:1-35, Al-Najm:1-29	319
29	Al-Najm:30-62, Al-Shāf:1-14	325
30	Al-Jumu'ah:1-11, Al-Mursalāt:1-50	292
31	Al-Nabā':1-40, Al-Dhuḥa:1-11	229
32	Al-Nashr:1-3, Al-Lahab:1-5, Al-Ikhlās:1-4, Al-Falāq:1-5, Al-Nās:1-6	226

Data source: Al-Imām Muḥammad Fakhr al-Dīn al-Rāzi, t.t.t., volt. 1-32

1) The influence of Fakhr al-Dīn al-Rāzi's interpretation thought

Today all scholars of *Qur'an* and scholarship almost never forget the work of Fakhr al-Dīn al-Rāzi which known as *Mafātiḥ al-Ghayb*. Besides being a reference, this work also becomes the object of study which can produce a number of findings and assessments from various. The commentary books which refer to Fakhr al-Dīn al-Rāzi's interpretation are *Tafsīr Anwār al-Tanzīl wa Asrār al-Ta'wīl* by *Al-Baidhawi,*[77] *Tafsīr Ruḥ al-Ma'āni fi Tafsīr al-Qur'ān al-Adzīm wa al-Sab' al-Matsāni* by al-Alūsi, *Tafsīr al-Qur'ān al-Hakim al-Masyhur bi al Tafsir al-Mannar* by Muḥammad Rasyīd Ridhā especially regarding to the reasons related to the initial issue of surah *al-Nisā'* which called *Ya Ayyuha al-Nās* as a verse which aimed to Mecca society or other.[78]

According to Ibn Khallikan's note, besides from the various fields, there are still many other Fakhr al-Dīn al-Rāzi's works which can attract attention and have spread in various countries, even this can increase the country's foreign exchange widely to reconstruct the works of the earlier scholars by using the latest

[77] Hamim Ilyas, *Studi Kitab Tafsir*, (Yogyakarta: Teras, 2004), p. 118
[78] Aswadi, *Konsep Syifa dalam Al-Qur'an: Kajian Tafsir Mafatih al-Ghaib Karya Fakhr al-Din al-Razi*, (Jakarta: Kementrian Agama Republik Indonesia , 2012), p. 53

method of Fakhr al-Dīn al-Rāzi as the first one who formulate the new findings systematically and has not been found in previous times.[79]

2) Scholar's views on Fakhr al-Dīn al-Rāzi and his work

Here are the views of some scholars about Fakhr al-Dīn al-Rāzi and *Mafātih al-Ghayb* book either in the form of criticism or praise:

a) Ibn Taimiyyah says that "there is all knowledge in it except the interpretation". Otherwise the view of *Taj'aldin Abi Nasr' Abd Wahhab bin Taqi al-Dīn al-Subki* says that "there is all knowledge in it with the interpretation too."[80]

b) Manna' Khalīl al-Qatthān comments that '*aqliyah* sciences dominated Fakhr al-Dīn al-Rāzi's thought in the interpretation, because he mixes it into various studies of medicine, logic, philosophy, and wisdom. This leads his book out from *ma'na-ma'na al-quran*.[81]

c) Ighnaz Goldziher says that *Mafātiḥ al-Ghayb* is the work of Fakhr al-Dīn al-Rāzi which called as the last work in an authentic interpretation literature, it always pays attention to the things which can be summarized by *mu'tazilah* genre in his interpretation method and managed to his own perfect method all the times.[82]

d) Related to whether Fakhr al-Dīn al-Rāzi completed his interpretation to the letter of al-Nās or not? Some scholars disagree

[79] Ibid, p. 71

[80] Mohd Manawi Mohd Akib, *Penghubi Syurga Menurut Pandangan Fakhr al-Din al-Razi*: *Tumpuan Terhadap Kitab Mafatih al-Ghaib*, Ushuluddin Journal, (Januari-Juni 2012), p. 29

[81] Manna' Khalil al-Qattan, *Mabahits fi Ulum al-Qur'an*, (Kaherah: Maktabah Wahbah. t.t), p. 357

[82] Ignaz Goldziher, *Madzhab Tafsir dari Klasik hingga Modern*, transalated by. M. Alaika Salamullah dkk, (Yogyakarta: Kalimedia, 2015), p.154

3) Al-Dzahabi in his work explains that Fakhr al-Dīn al-Rāzi interprets *Quran* only stops on surah *al-Anbiyā'*, this opinion is taken from Kasyif Dunūn by *Sayyid Syihāb*.[83]

a) Some say the first part is written by Fakhr al-Dīn al-Rāzi and the second part is perfected by both followers, Syeikh Najm al-Dīn Aḥmad bin Muḥammad al-Qammuli and Syihāb al-Dīn bin Khalīl al-Khuwaiyah.

b) Muḥsin 'Abdul Ḥamīd says that *Mafātiḥ al-Ghayb* is the whole Fakhr al-Dīn al-Rāzi's interpretation.[84]

5. The underlying factors of Fakhr al-Dīn al-Rāzi's thoughts

Fakhr al-Dīn al-Rāzi lived in 11th-12th century AD when the glory of Islam still developed in Baghdad, exactly at the time of *Abbasiyah* caliph. In the field of astronomy, Muslim scientists are basically much inspired by the three civilizations of classical Greek,[85] Persia and India. Other references mention the ancient Egyptian civilization, Mesopotamia, China, France, and Greece.[86] In 340 BC, the Greek philosopher Aristotle in his book entitled "on the heavens" argued that the earth is round and in silence, while the sun, moon, planets and stars move around it. Followed by Ptolomeus in his work entitled al-Magest (al-Majisty) as an astronomy encyclopedia, its main contribution is related to planetary theory and moon movement while the used system is geocentric (the center of the solar system is the earth), further influenced by the Persians (zij-I shahri-yari) and

[83] Al-Dzahabi, *al-Tafsir wa al-Mufassirun*, Vol 1, p.291
[84] Muhsin Abdul Hamid, *al-Razi Mufassiran*, (Baghdad: Dar al-Hurriyah li al-Tab'ah, 1974). p. 55-54
[85] Siti Nurjanah, *Kosmologi dan Sains Islam*, STAIN Metro, p. 9
[86] Susiknan Azhari, *Perkembangan Kajian Astronomi dalam Islam di Alam Melayu*, Fiqh Journal, No 7 (2010), p. 169

Indian (siddhanta). But along with the massive movement of text translation during the reign of al-ma.mu, Greek monopolized those field because al-Magest, Tetrabiblos and Ptolemaic astronomical tables known as Conenes Procheiroi are translated repeatedly.[87]

As a *mufassir* who also becomes an expert in philosophy, Fakhr al-Dīn al-Rāzi does not reject it and he accepts the Greek culture totally, as his statement: "the man who accepts the Greek philosophy thoroughly without any kinds of selection and the one who rejects the philosophy without exception, both equally are wrong. One should have studied deeply the works of earlier philosophers, accepted the right idea and rejected the wrong, so it will add new ideas in the philosophy itself."

In line with his interpretation method *bi al-ra'yi*, Fakhr al-Dīn al-Rāzi also adopts the science of former philosophers, astronomers and geographers in interpreting the certain verses but when it cons to *Qur'an* and his thought concept, Fakhr al-Dīn al-Rāzi will refuse it. For example, the former non-*Muslim* philosopher argues that the earth moves and does not come out of its orbit; in this case Fakhr al-Dīn al-Rāzi does not question about it, but when there is a question why does it happen (the earth circulates in its orbit)? The philosopher answered it is caused by the natural factors (the usual thing) while Fakhr al-Dīn al-Rāzi argued and stated that the event is impossible except the God willing as المختار (Q.S. Al-Rūm: 25). From the discussion above, it can be seen that Fakhr al-Dīn

[87] Muqawim, *Jaringan Keilmuan Astronomi dalam Islam pada Era Kalsik*, Jurnal Kaunia, Vol. 3, No. 1 (April, 2007), 75-77

al-Rāzi thought which contained in his interpretation work besides categorized as a science of Islamization paradigm model and the integration-interconnection.

CHAPTER IV

NICOLAUS COPERNICUS AND FAKHR AL-DĪN AL-RĀZI'S THOUGHT ABOUT SOLAR CIRCULATION

A. Heliocentric Theory of Nicolaus Copernicus in On the Revolutions of the Heavenly Spheres

This theory assumes that the sun is as the center of the planets circulation, including the earth. While the moon surrounds the earth simultaneously then the earth revolves to the sun. But the sun is just spinning on its axis. In this heliocentric view, the planets which exist in outer space are circling the sun with their rounded elliptical orbits, where the sun is as the center of it. Copernicus announced his paper in 1543 AD about the earth which surrounding the sun. So, it is clear that when we read the chronological history, it can be concluded that this heliocentric theory is also called the Copernicus system, a system where the sun as the center of the Solar System. This system in English is called Heliocentric, and in Arabic called *Mukhtash bi markaz Al-Syams*.[88] Heliocentric theory has become the common prejudices for 4 centuries that the sun is surrounded by the earth and becomes the center of the solar system. This theory is widely developed by astronomers. For example, an English astronomer, Sir William Herschel can see the constellations of the Milky Way.

There are nine planets that we know in our solar system namely: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune and Pluto, which all of them

[88] Susiknan Azhari, Ensiklopedia Hisab Rukyat, (Yogyakarta: Pustaka Pelajar, 2008), p.193

revolve to the sun. For Pluto, it is disputed whether it belongs to the planets in our solar system or not.[89] Nicolaus Copernicus was not really the first person who emerged the heliocentric theory. Before him, in the 13th century BC there was a Greek philosopher named Aristarchus who expressed that the earth and planets revolved to the sun. But at that time Aristarchus' work was just a hypothesis, it's not written in papers. Moreover, at that time the Aristarchus' opinion was inconsistent with Aristotle's opinion (384 BC-322 BC), so Heliocentric theory of Aristarchusis marginalized by the Geocentric theory which states that the earth as the center of stars rotation. The planets included in it are the sun and moon, moreover by the emergence of Ptolemy (140 AD) who known as the pioneer of geocentric theory. His work entitled "Almagest" becomes the reference of the astronomers for many centuries.[90]

Nicolas Copernicus explicitly says that the sun becomes the center of the solar system, and the earth surrounds it in a circular orbit. In this heliocentric system, the stars are still considered existing in a celestial sphere and also revolving to the sun (revolving in the center), there are planets (including the earth) which always revolves to those stars along the respective circular paths. The Copernicus system is simpler and easier to be used to predict the movement of celestial bodies than the Ptolemy System (the epicycles planets). The person who first mastered the exact sciences is Nicholas Copernicus (1473-1543). After studying at the University of Cracau, Bologna Ferrara, he studied at the center of

[89] Nicholas Copernicus, On the Revolutions of the Heavvenly Spheres, (Canada: Pythagoras Publishing, 1543), p. 34
[90] Slamet Hambali, *Heliocentrisme dan Astronomi Islam*…… op.Cit, p. 227

the exact science and experiments in Padua. Copernicus became a cathedral official in Frauenburg (East Germany) and worked as an administrator, diplomat, and advisor at the university. At first he was forced to accept Ptolomeus's astronomical learning formally (geocentric). Along with the development of his mindset, he doubted the truth, and finally Copernicus examined it thoroughly by using the data of exact science, both the old and new things in exact sciences. For orbital problems Copernicus obtained the data from seeing indications of deviations in the angular velocity of planets' orbits. However, he maintains the circular orbital shape by stating that the orbit is not concentric. Then he reviews Aristarchus's theory and wrote a book. In the end of the 1540s he produced a work entitled "De Revolusionibus Orbium Colestum" (the reversal of the celestial bodies, 1543). In his book, he states that there was a fact he had known that the earth rotates on its axis (rotation) just as the other planets revolve to the sun (revolution). Copernicus theory received great attention from scientists of that era, especially from the practical astronomers, although there were still some astronomers who test it. However, this theory is more widely accepted by the scientists accompanied by further experiments. With the simple tools which existed at the time, Copernicus studied the movements of the sun, planets, and stars. Of course, he also studied astronomy of ancient Greece. He concludes that if the sun is silent, the earth and the planets are surrounding the sun.

It means, according to Copernicus, the sun is actually as the center of our solar system. However, Copernicus still considers the planets' orbits are still in circles. While the sun is silent as the center of circulation in the middle of the

circle, the stars are also stationary. Copernicus knew very well the dangers of issuing opinions contrary to the opinion of the church, moreover the Pope's opinion at that time. For thirty years, he kept his book in a locked spot while making further observations. But eventually he decided to publish it. The heliocentric theory of Copernicus was presented in its publication entitled De Revolutionibus Orbium Colestium to Pope III and accepted by the church. On May 24, 1543, at the time his book sample was shown to him, he passed away. This book Consist of 11 chapter below:[91]

1. That the Universe is Spherical

   Copernicus said that the universe is spherical because that the figure is the most perfect, as not being articulated but whole and complete in itself; or because it is most capacious and therefore best suited for that which is to contain and preserve all things; or again because all the perfect parts of it, namely, Sun, Moon and Stars, are so formed; or because all things tend to assume this shape, as is seen in the case of drops of water and liquid bodies in general if freely formed.

2. That the Earth also is Spherical

   The also spherical, but the Earth does not appear absolutely spherical, because of the mountains and valleys; yet these make but little variation in its general roundness, as appears with what follows. In the East do not see eclipses of the Sun and Moon which occur in the

[91] Nicholas Copernicus, *On the Revolutions of the Heavvenly Spheres*…… Op.Cit, p. 12-28

evening here, nor do they in the West see those which occur here in the morning.

3. How Earth, with the Water on it, Forms one Spheres

The waters spread around the Earth form the sea and fill the lower declivities. The volume of the waters must be less than that of the Earth, else they would swallow up the land (since both, by their weight, press towards the same center). For spheres are to each other as the cubes of their diameters. lf, therefore, there have been seven parts of water to one of Earth, the Earth's diameter could not be greater than the radius of the waters.[92]

4. That the Motion of the Heavenly Bodies is Uniform, Circular, and Perpetual, or Composed of Circular Motion

We now note that the motion of the heavenly bodies is circular. Rotation is natural to a sphere and by that very act is its shape expressed. For here we deal with the simplest kind of body, wherein neither beginning nor end may be discerned nor, if it rotate ever in the same place, may the one de distinguished from the other.

5. Whether Circular Motion Belongs to the Earth; and Concerning its Position

Since it has been shown that Earth is spherical, we now consider whether her motion is conformable to her shape and her position in the Universe. Without these we cannot construct a proper

[92] Ibid, p. 23

theory of the heavenly phenomena. Now authorities agree that Earth holds firm her place at the center of the Universe, and they regard the contrary as unthinkable, nay as absurd. Yet if we examine more closely it will be seen that this question is not so settled, and needs wider consideration.

6. Of the Vastness of the Heavens Compared to the Size of the Earth

The size of the Earth is insignificant in comparison with the Heavens, may be inferred thus. The bounding Circles (interpreting the Greek word horizons) bisect the Celestial Sphere. This could not be if the size of the Earth or its distance from the center were considerable compared with the Heavens - for a circle to bisect a sphere must pass through its center and be in fact a great circle.

7. Why the Ancients Believed that the Earth is at Rest, like a Centre, in the Middle of the Universe.

The ancient Philosophers tried by divers other methods to prove Earth fixed in the midst of the Universe. The most powerful argument was drawn by the doctrine of the heavy and the light. For, they arguer, Earth is the heaviest element, and all things of weight move towards it, tending to its center. Then, says Ptolemy, Earth moves at least with a diurnal rotation, the result must be reverse of that described above. For the motion must be of excessive rapidity, since in 24 hours it must impart a complete rotation to the earth.

8. The lssue efficiency of these Arguments and Their Refutation

Earth surely rests at the centre of the Universe. Now if one should say that the Earth moves, that is as much as to say that the motion is natural, not forced; and things which happen according to nature produce the opposite effects to those due to force. Things subjected to any force, gradual or sudden, must be disintegrated, and cannot long exit. But natural processes being adapted to their purpose work smoothly.

9. Whether More than one Motion can be Attributed to the Earth, and of the Centre of the Universe.

The earth is not the center of all revolutions is proved by the apparently irregular motions of the planets, and the variations in their distances from the Earth. These would be unintelligible if they moved in circles concentric with Earth. Since, therefore, there are more center than one, we may discuss whether the center of the Universe is or is not the Earth's center of gravity.

10. Of the Order of the Heavenly Bodies

No one doubts that the Sphere of the Fixed Stars is the most distant of visible things. As for the planets, the early Philosophers were inclined to believe that they form a series in order of magnitude of their orbits. They adduce the fact that of objects moving with equal speed, those further distant seem to move more slowly (as is proved in

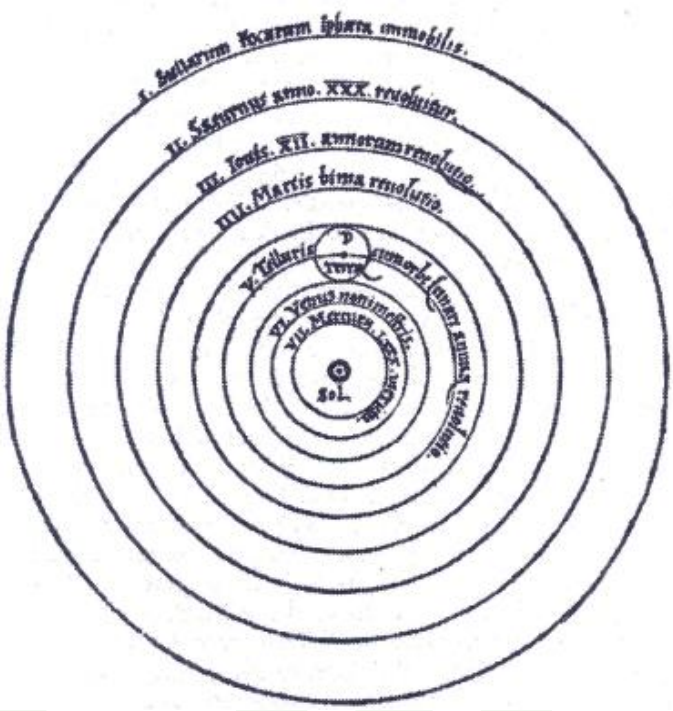
Euclid's Optics). They think that the Moon describes her path in the shortest time, because, being nearest to the Earth, she revolves in the smallest circle. Furthest they place Saturn, who in the longest time describes the greatest orbit. Nearer than this is Jupiter, and then Mars.

11. Explanation of the Threefold Motion of the Earth

Since then planets agree in witnessing to the possibility that Earth remove, we shall now briefly discuss the motion itself, in so far as the phenomena can be explained by this hypothesis. This motion was must take to be threefold. The first defines the cycle of night and day. It is produced by the rotation of the Earth on its axis from West to East, corresponding to the opposite motion by which the Universe appears to move round the equinoctial circle, that is the equator, which some call the "equidial" circle. The second is the annual revolution of the center of the Earth, together with all things on the Earth. This describes the ecliptic round the Sun, also from West to East, that is, backwards, between the orbits of Venus and Mars

Nicolaus Copernicus's great work, entitled "De Revolutionibus Orbium Coelestium," (Spherical Revolution of celestial bodies) which describes his theory in detail and puts forward his proofs, at that time he got many hard challenges from many circles, among them the Lutherans were the first communities who mention De Revolutionibus Orbium Coelestium book "doesn’t make any sense". The Catholic Church, while not initially expressing criticism, has decided that De

Revolutionibus Orbium Coelestium book contradicts its official doctrines and in 1616 AD. They included Nicolaus Copernicus's work into the forbidden books, then it was revoked from the new forbidden list on year 1828 M.[93]



Picture.1.1

Note:[94]

I. There is no one center of all the celestial circles or spheres.
II. The center of the Earth is not the center of the Universe, but only of gravity and of the lunar sphere.
III. All the spheres revolve about the Sun as their mid-point, and therefore the Sun is the center of the Universe.

[93] Robbin Kerrod, *Bengkel Ilmu Astronomi*, (Jakarta: Erlangga, 1999), p. 39
[94] Nicolaus Copernicus, *On the Revolutions*……op.Cit, p. 17

IV. The ratio of the Earth's distance from the Sun to the height of the firmament is so much smaller than the ratio of the Earth's radius to its distance from the Sun that the distance from the Earth to the Sun is imperceptible in comparison with the height of the firmament.

V. Whatever motion appears in the firmament arises not from any motion of the firmament, but from the Earth's motion. The Earth together with its circumjacent elements performs a complete rotation on its fixed poles in a daily motion, while the firmament and highest heaven abide unchanged.

VI. What appear to us as motions of the Sun arise not from its motions but from the motion of the Earth and our sphere, with which we revolve about the Sun, like any other planet. The Earth has, then, more than one motion.

VII. The apparent retrograde and direct motion of the planets arise not from their motion but from the Earth's motion. The motion of the Earth alone, therefore, suffices to explain so many inequalities in the heavens.

B. Fakhr al-Dīn al-Rāzi's Interpretation about the Solar Circulation

1. The Solar is the Center of the Universe

The word الشَّمْس is mentioned 32 times and all are in the form of *mufrad* shape.[95] Here are the following verses which reveal about the sun in Qur'an.

[95] Quraisy Shihab, *Ensiklopedia al-Qur'an: Kajian Kosa Kata*, (Jakarta: Lentera Hati, 2007), p. 297.

Table 1.2

The Verses of Qur'an about the Solar

Number	Word	Place of The Verse	Specification of The Verse
1		Al-Baqarah: 28	Madaniyah
2		Al-An'ām 6: 78	Makkiyah
3		Al-An'ām 6: 96	Makkiyah
4		Al-A'rāf 7: 54	Madaniyah
5		Yunus 10: 5	Makkiyah
6		Yusuf 12: 4	Makkiyah
7		Al-Ra'd 13: 2	Madaniyah
8		Ibrāhim 14: 33	Makkiyah
9		An-Naḥl 16: 12	Makkiyah
10		Al-Isrā' 17: 78	Makkiyah
11		Al-Kahfi 18: 17	Makkiyah
12		Al-Kahfi18: 86	Makkiyah
13		Al-Kahfi 18: 90	Makkiyah
14		Thāha 20: 130	Makkiyah
15		Al-Anbiyā' 21: 33	Makkiyah
16		Al-Ḥajj 22: 18	Madaniyah
17	الشَّمْسِ	Al-Furqān 25: 45	Makkiyah
18		Al-Naml 27: 24	Makkiyah
19		Al-'Ankabut 29: 61	Makkiyah

20		Luqmān 31: 29	Makkiyah
21		Fathīr 35: 13	Makkiyah
22		Yāsin 36: 38	Makkiyah
23		Yāsin 36: 40	Makkiyah
24		Al-Zumār 39: 55	Makkiyah
25		Fushilat 41: 37	Makkiyah
26		Qāf 50: 39	Makkiyah
27		Al-Rahmān 55: 5	Madaniyah
28		Nūḥ 71: 16	Makkiyah
29		Al-Qiyāmah 75: 9	Makkiyah
30		Al-Insān 76: 13	Madaniyah
31		Al-Takwīr 81: 1	Makkiyah
32		Al-Syams 91: 1	Makkiyah

So many verses told about sun, but the author will explain only several verses from Fakhr al-Dīn al-Rāzi's interpretation. In the commentary of *Mafātih al-Ghayb*, Fakhr al-Dīn al-Rāzi reveals that the sun has two headquarters called *Murakkaz al-'Alām* and *Fauqa Murakkaz al-'Alām* which are analogous to white and egg yolk color, the meaning of the sun (egg yolk) is likened to the center solar system while other planets (white color) surround on the sun.[96] From that statement, a contradiction appears between Fakhr al-Dīn al-Rāzi's thought and

[96] Fakhr al-Din al-Razi, *Mafatih al-Ghaib*, Vol, 26 (Dar al-Fikr: Beirut, t.t), 77. See also vol 25, 161

Ptolemous's geocentrism theory which had develop and become a reference of human understanding in the 11th-12th century AD because it was dominated by Ancient Greek civilization.

Based on the calculations of the astronomers, due to the activity of the galaxy, the sun travels at speeds of 720,000 km/h to Solar Apex, a place in the space field which close to the star Vega. This means the sun moves about 720.000 x 24 = 17.280.000).[97] This phenomenon has been mentioned in Surah Yāsin verse 38 as follows:

والشمس تجري لمستقر لها ذلك تقدير العزيز العليم (يس:38)

"*And the sun runs unto resting place for him that is the decree of (him) the Exalted in Might, the Knowing."*[98]

[97] Agus Mulyono et al, *Fisika dan al-Qur'an*, (Malang, UIN Malang Press, 2006 Fisika dan al-Qur'an), p 49

[98] Tim Qomari, *Al-Qur'an Terjemah Paralel Indonsia Inggris* ….op.cit, p. 442

٧١ قوله تعالى : والشمس تجري لمستقر لها . سورة يس .

وَٱلشَّمْسُ تَجْرِى لِمُسْتَقَرٍّ لَّهَا ۚ ذَٰلِكَ تَقْدِيرُ ٱلْعَزِيزِ ٱلْعَلِيمِ ﴿٣٨﴾

قوله تعالى : ﴿ والشمس تجرى لمستقر لها ذلك تقدير العزيز العليم ﴾ .

يحتمل أن يكون الواو للعطف على الليل تقديره : وآية لهم الليل نسلخ والشمس تجرى والقمر قدرناه ، فهى كلها آية . وقوله (والشمس تجرى) إشارة إلى سبب سلخ النهار فانها تجرى لمستقر لها وهو وقت الغروب فينسلخ النهار ، وفائدة ذكر السبب هو أن الله لما قال نسلخ منه النهار وكان غير بعيد من الجهال أن يقول قائل منهم سلخ النهار ليس من الله إنما يسلخ النهار بغروب الشمس فقال تعالى (والشمس تجرى لمستقر لها) بأمر الله فمغرب الشمس سالخ للنهار فبذكر السبب يتبين صحة الدعوى ويحتمل أن يقال بأن قوله (والشمس تجرى لمستقر لها) إشارة إلى نعمة النهار بعد الليل كأنه تعالى لما قال (وآية لهم الليل نسلخ منه النهار) ذكر أن الشمس تجرى فتطلع عند انقضاء الليل فيعود النهار بمنافعه ، وقوله (لمستقر) اللام يحتمل أن تكون للوقت كقوله تعالى (أقم الصلاة لدلوك الشمس) وقوله تعالى (فطلقوهن لعدتهن) ووجه استعمال اللام للوقت هو أن اللام المكسورة فى الأسماء لتحقيق معنى الإضافة لكن إضافة الفعل إلى سببه أحسن الإضافات لأن الإضافة لتعريف المضاف بالمضاف إليه كما فى قوله : دار زيد لكن الفعل يعرف بسببه فيقال اتجر للربح واشتر للأكل ، وإذا علم أن اللام تستعمل للتعليل فنقول وقت الشيء يشبه سبب الشيء لأن الوقت يأتى بالأمر الكائن فيه ، والأمور متعلقة بأوقاتها فيقال خرج لعشر من كذا (وأقم الصلاة لدلوك الشمس) لأن الوقت معرف كالسبب وعلى هذا فمعناه تجرى الشمس وقت استقرارها أى كلما استقرت زماناً أمرت بالجرى فجرت ، ويحتمل أن تكون بمعنى إلى أى إلى مستقر لها وتقريره هو أن اللام تذكر للوقت وللوقت طرفان ابتداء وانتهاء يقال سرت من يوم الجمعة إلى يوم الخميس فجاز استعمال مايستعمل فيه فى أحد طرفيه لما بينهما من الاتصال وتؤيد هذا قراءة من قرأ (والشمس تجرى إلى مستقر لها) وعلى هذا فو ذلك المستقر وجهه

Picture.1.2

In this verse, al-Rāzi explain that the sun runs and spins on its axis, while the earth which in front of the sun, also runs and rotates on its axis.[99] The word تجري in the verse above means ‘go, walk, circulate, or flow’. Because the subject of the verse is the sun, the exact meaning is circulating, meaning the sun is circulating to the place of its dismissal.

[99] Fakhr al-Din al-Razi, *Mafatih al-Ghayb*, Vol, 26…p 71

Fakhr al-Dīn al-Rāzi's explains in detail about the sun circulation. He begins his interpretation by discussing lafadz لمستقر In terms he said, the word لمستقر can be interpreted with two kinds of interpretation, the first letter ل in lafadz لمستقر contains the meaning of time which means the sun is running in its time and its circulation.[100] Similarly, in Qur'an Surah al-Isra' verse 78 أَقِمِ الصلاة لِدُلُوكِ الشمس letter ل the verse means a time: "*Establish prayer at the decline of the sun*" which in this verse describes the time of dzuhur prayer. The meaning in lafadz لمستقر is the time when the sun remains, then the sun will return to run because of Allah commands.

The second, the letter ل on lafadz لمستقر is interpreted as the letter إلى which means the sun is circulating to the place of its circulation, the highest and lowest place, the most east and west of the sun where it will rise from the east and set from the west. In the context of this verse the letter ل in لمستقر means إلى but it is not written by using إلى because the letter ل is useful to remind the time when the time has two ends those are the beginning and the ending as the sun appears.

[100] Kementrian agama RI, *Al-Qur'an dan Tafsirnya*, (Jakarta: Kementrian Agama, 2010), p 8/226

When the dawn rises and ends and when the sun sets equally like the previous explanation.

According to *ashābul ha'iah*[101], the sun is inside the globe (the astronomical vessel) or the place where the celestial bodies are circulating, which in the context of this verse is the place of the sun's orbit. Meanwhile, according to the ancient philosophers, the sun runs into its circulation because of the command, when the sun is commanded not to move it won't move and if it is ordered to run, the sun will run. Then Allah replied that opinion with the verse ذلك تقدير العزيز العليم meaning the silence and the movement of the sun is not because of the command, but it is a destiny and God's willing to subdue the sun to run itself automatically.

At the end of his interpretation of Surah Yāsin verse 38, Fakhr al-Dīn al-Rāzi said that his opinion about the sun circulation is very much, but he thinks that lafadz لمستقر is where the sun runs; the sun runs to its place.

God predestined the sun not only to run, but also to provide its benefits for humans in order the humans are able to gain the knowledge from it, so it can be developed as the science that discusses about the sun and the astronomy science specifically. From this, it can be seen that a large star does not just sit alone somewhere but moves and circulates on its outline.[102]

[101] Ashabul Ha'ah is the astronomer, this term of Arabic race astronomer
[102] Kementrian Agama, *Al-Qur'an dan Tafsirnya* …., p 224

In another surah also describes the sun circulation, that is in surah Luqmān verse 29 as follows:

ألم تر أن الله يولج الليل فى النهار ويولج النهار فى الليل وسخر الشمس والقمر كل يجري الى اجل مسمى وان الله بما تعملون خبير(لقمان: 29)

"*And your creation on your resurrection is in no wise but as an individual soul for Allah is he who hears and sees (all things)"*[103]

The verse above shows that the sun and moon circulate until the end of its time, which is marked by the Day of Judgment. The time limit is a form of God's power. The sun runs while spinning on its axis, the earth is in front of it also runs while turning on its axis.[104] The word تجري in the verse above means 'go, walk, circulate, or flow'. Because the subject of the verse is the sun, the proper meaning is circulating, which means the sun is circulating to the place of its dismissal. The sun, which is a great star, not only stops somewhere but moves and circulates in its spin.[105]

The sun rotates on its axis every 25 days and runs at 250 kilometers per second. At the same time, the moon, the earth, and the sun rotate together around the center of the galaxy every 250 million years. Similarly, the galaxy with all the stars in it rotates on its axis every 250 million years.[106] The sun also circulates at a

[103] Tim Qomari, Al-Qur'an *Terjemah Paralel Indonsia Inggris* ….op.cit, p. 413
[104] Kementrian agama RI, *Al-Qur'an dan Tafsirnya*, (Jakarta: Kementrian Agama, 2010), p 8/226
[105] Ibid, *Al-Qur'an dan Tafsirnya*, p 224
[106] Fakhr al-Din al-Razi, *Mafatih al-Ghayb*….. Vol 32, p. 124

certain speed for a certain period of time. And it will stop circulating at a certain place and times anyway.[107]

2. Functions and Wisdom of the Sun Circulation

1) Surah Ibrahim : 3

وسخرلكم الشمس والقمر دائبين صلي.....

"Those who prefer the life of his world more than the hereafter who hinder (men) from the path of Allah and seek to make it crooked, they are astray by a long distance"[108]

Fakhr al-Din al-Razi describes the creation of the sun and the moon has many benefits, as described in surah al-Rahman: 5, Al-An'am: 96, and so forth.

2) Surah Al-Rahman : 5

الشمس والقمر بحسبا ن

"The sun and the moon [exactly] computed[109]*"*

Fakhr al-Din al-Razi asserts that the circulation of the sun and moon as a sign of متحرك مختار is the Essence of the mover and the chooser of the matter according to His will, so the moon and the sun do not circulate by

[107] Dr.Nadiah Thayyarah, *Buku Pintar Sains dalam Al-Qur'an*, (Jakarta: Zaman, 2013), p 323
[108] Tim Qomari, Al-Qur'an *Terjemah Paralel Indonsia Inggris* ….op.cit, p 225
[109] Tim Qomari, *Al-Qur'an Terjemah Paralel Indonsia Inggris* ….op.cit , p. 531

itself. The meaning of the word بحسبا ن consists of: 1) the view of the sun and the moon can be used as a calculation of time (2) the circulation of the sun and the moon in certain orbits (3) the circulation of the sun and the moon in their respective orbits.[110] This is one of the regularities of God's creation, in which God has set the distance measurement of the sun and moon, so harmoniously humans can see its beauty. Earth-sun distance (150 million km) = 400 times Earth-moon distance (384,400), solar diameter (1,392,000 km) = 400 times the diameter of the moon (3.475 km). Consequently, when a total solar eclipse occurs, the sun and moon are in the exact same angle. The field slope from the moon's orbit to the orbit surrounding the sun is so small, so that the moon's appearance in the sky is very close.[111]

3) Surah Al-An'am : 96

فا لق الإ صباح وجعل الليل سكنا و الشمس والقمر حسبا نا ج.....

"[He is] that cleaver of the daybreak (from the dark) and makes the night for rest and the sun and moon for the reckoning (of time) the judgment and ordering of (him) the exalted in power the on nescient"[112]

The calculation meaning of solar and lunar circulation is discussed also in Q.S. *Yunus* (10):5, Q.S. *Al-Rahman* (55):5. In this case, the intended circulation of the sun (fast and slow movement) is completed for one year, while the month circulation is completed for one month.

[110] Nur Azizah, *Peredaran Bulan dalam Qur'an…* Op.Cit, p. 43
[111] Tim Tafsir Ilmiah Salman ITB, *Tafsir Salaman Tafsir Ilmiah Atas Jus Amma*, (Bandung: Mizan, 2014), p 337
[112] Tim Qomari, *Al-Qur'an Terjemah Paralel Indonsia Inggris* ….op.cit , p. 140

According to Fakhr al-Din al-Razi, the creation of the sun and moon which produce the calculation of time can be known from the circulation.[113]

3. The Nature of the Sun

1) Sunlight

Surah Nuh verse 16:

وَجَعَلَ الْقَمَرَ فِيهِنَّ نُورًا وَجَعَلَ الشَّمْسَ سِرَاجًا

"And made the moon a light in their midst and made the sun as (glorious) lamp?"[114]

In Arabic, the meaning of the sun is الشمس. Fakhr al-Din al-Razi explains that the moonlight is weaker than the sunlight; the word نور is equated with the moon because the moon shines at night while the sunset becomes the sign of the earth's darkness and the sun appears to obliterate its very strong rays called سراجا.[115] Qur'an distinguishes the size of the sun and moon by distinguishing the term of light (نور) for the moon and lamp (سراج) or ray (ضياء) for the sun, in which the word *ray* (**ضياء**) is stronger

[113] Fakhr al-Din Al-Razi, *Mafatih al-Ghayb*, Vol 13….. p 104-105
[114] Tim Qomari, Al-Qur'an *Terjemah Paralel Indonsia Inggris* ….op.cit, p. 571
[115] Fakhr al-Din al-Razi, Mafatih al-Ghaib, Vol 30, (Dar al-Fikr: Beirut, t.t), p 140-141

than *light* (نور).[116] The first, the moon's body is exposed to the light. The second is the space which is fixed in combustion as a constant source of the light and heat. It is a source of the light in the form of the sun. The sun is not a solid surface and rigid as like the earth, but it is a big gas ball, and also becomes one of the stars in this universe. The sun becomes the closest star to the earth, so the research of this star is easier to do than other stars. The word (ضياء) is the light which generated from the sun, whereas the word (نور) is a former of the sunlight itself.[117] While the moon shines from the sun reflection. The sun has a distance of 150 million km from the earth, and it provides the energy needed by life on this earth constantly.[118]

The sun emits the white light, but the white light is the combination of all wavelengths. This is in accordance with the word of God in the Surah as-Syams verse 1: والشمس و ضحها "*by the sun and its light*". The purpose of the word ضحها in that verse is the incandescent sunlight.[119] If the sun's white rays are passed through the prism glass, the certain wavelengths are dispersed, and those rays are divorced into a rainbow-colored belt

[116] Al-Zamaksyari, Al-Kasyaf 'an Haqaiqi Ghawamidhi al-Tanzil wa 'Uyun al-Aqail, 3rd Chapter, (Maktabah Aikabah, 115), p. 457-538
[117] PDF Mohammad Faiz bin Jani, "Muzakirah Ilmu Falak", Universiti of Malaya: Malaysia, tt, p 91
[118] Agus Mulyono dkk, Fisika dan al-Qur'an, (Malang, UIN Malang Press, 2006), p 47
[119] Muhammad Ibn Yusuf al-Syahid bi Abi Hayyan al-Alusi, Tafsir Bahr al-Muhith, (Lebanon:Dar al-Kutub al-'Alamiyah), p. 473

consisting of red, orange, yellow, blue, indigo and purple. These are called the visible or continuous spectrum taken from the Law Kirchoff which states that the solid, liquid or gaseous substances are glowing under high pressure will produce a spectrum.[120]

4. Solar Eclipse

The sun is a star. Stars have their own light source, because as a light source, the entire surface can emit the light, so that from any direction we can see it in the same situation. The moon as a satellite of the earth always moves around the earth, then at certain times, its position is exactly parallel to the earth and the sun, the position of the moon is also in the middle between the sun and the earth.[121] When the moon is in front of the earth in the direction of the sun, then we cannot see it, or in other words, we are looking at the part of the night. Then suddenly the dark body of the moon appears blocking our view into the sunlight, so that this natural situation becomes dark called solar eclipse.

This phenomenon is described in Surah Yasin verses 37-40

واية لهم الليل نسلخ منه النهار فإذا هم مظلمون (37) والشمس تجري لمستقر لها ذلك تقدير العزيز العليم (38) والقمر قدرنه منازل حتى عادك العرجون القديم (39) لا الشمس ينبغى لها أن تدرك القمر ولا اليل سابق النهار وكل فى فلك يسبحون (40)

"And a sign for them is the night. We remove from it [the light of] day, so they are [left] in darkness. (37)"

"And the sun runs [on course] toward its stopping point. That is the determination of the Exalted in Might, the Knowing. (38)"

[120] Dr. Maurice Bucaille, Al-Qur'an dan Sains Modern (Terjemahan The Bible, the Qur'an and Science), (Jakarta: Media Dakwa, 1992), p 20

[121] S. Anwar Efendi dkk, Alam Raya dan Al-Qur'an, (Jakarta: PT. Pradnya Paramita, 1994), p 286

"And the moon - We have determined for it phases, until it returns [appearing] like the old date stalk. (39)"

"It is not allowable for the sun to reach the moon, nor does the night overtake the day, but each, in an orbit, is swimming. (40)"[122]

In the verse 37 describes about the solar eclipse. Another word of *left* is *sudden*[123], meaning the situation of light or day suddenly becomes dark because the sun and the earth are blocked by the moon. The phenomenon of eclipse makes the moon as if having a contact with the sun, but Allah denies it by verse 40. The sun and the moon (the earth's satellites)[124] are impossible to collide, because logically this verse reveals that the sun and moon have its own orbits and it is impossible to crash one another.[125] Those orbits as the trajectory can make the sun and the moon pass in one straight line any time where the moon is between the sun and the earth, so this is called a solar eclipse.

The solar eclipse occurs when the moon is between the sun and the earth. Any object that is highlighted by the sun, gives rise to the shadows. Likewise with the moon when it is in front of the sun, its body throws the shadows which reach the earth. The shadow of the moon that reaches into the earth is divided into 2 types.

Fakhr al-Dīn al-Rāzi states that the moonlight appears after the sun sets precisely at the beginning of the month when *hilal* or the moon occurred (*Atha ',*

[122] Tim Qomari, *Al-Qur'an Terjemah Paralel Indonsia Inggris* ….op.cit, p. 445

[123] Fakrh al-Din al-Razi, Vol Fakhr al-Din al-Razi, *Mafatih al-Ghaib*, Vol, 26 (Dar al-Fikr: Beirut, t.t), 77. See also vol 25, 159

[124] Satellites are objects that exist in outer space orbiting other objects, such as planets, with certain rotational and revolutionary times.

[125] Lajnah Pentashihan Mushaf Al-Qur'an, Badan Litbang dan Diklat Kemenag RI, LIPI, *Pencipaan Jagat Raya: Dalam Prespektif al-Qur'an dan Sains*, (Kemenag RI: Jakarta, 2012) p. 96

Qatādah and *al-Kullab*). Second, the moon surrounds the sun in its irradiation (the moonlight comes from the sun as a light source). Third, the moon accompanies the whole sun. When a full moon happens, the moon as if replaces the sun's position so it looks bright white at night.[126]

هوالذي جعل الشمس ضياء والقمر نورا وقدره منازل لتعلموا عدد السنين والحساب.....

> *"It is He who made the sun a shining light and the moon a derived light and determined for it phases - that you may know the number of years and account [of time]. Allah has not created this except in truth. He details the signs for a people who know."*[127]

Initially Fakhr al-Dīn al-Rāzi explains the previous munāsabah verse, after Allah confirmed the Judgment Day when all beings will return to Him and he relates it to the creation of the heaven and the earth. In this case Fakhr al-Dīn al-Rāzi mentions the sun shine and luminous moon, he sets the places of the sun and moon circulation in orbit to know the number of years and months which are useful for humans and it can be used to organize important programs in agriculture, and the calculation winter and summer.

Fakhr al-Dīn al-Rāzi distinguishes the word نورا and ضياء. The word نورا shows a relative light situation, so the moonlight is weaker than sunlight, while the word ضياء shows a light situation which shines very strong (light). Furthermore, Fakhr al-Dīn al-Rāzi explains the benefits of the sun creation and

[126] Al-Razi, Vol. 31, 190-191
[127] Tim Qomari, *Al-Qur'an Terjemah Paralel Indonsia Inggris* ….op.cit, p. 512

the enormous moonlight as a form of the extent of grace and great attention of Allah to beings. The sun as the daytime ruler whose circulation causes the change of seasons, while the moon as the night ruler[128], which from the circulation we can know the number of months *(hijriyah)*, the phases (changes in shape) affect the moisture content of nature, and its daily circulation influence the daylight and night, where the noon as time to work and night time to rest for humans. Then Fakhr al-Dīn al-Rāzi explain also in other verses:

1) Yāsin :40

لا الشمس ينبغي لها ان تدرك القمر و لا الليل سابق النهار ۚو كل في فلك يسبحون

"It is not allowable for the sun to reach the moon, nor does the night overtake the day, but each, in an orbit, is swimming."[129]

[128] Ibid, Vol. 26, p. 44
[129] Tim Qomari, *Al-Qur'an Terjemah Paralel Indonsia Inggris* ….op.cit, p. 436

لَا ٱلشَّمْسُ يَنۢبَغِى لَهَآ أَن تُدْرِكَ ٱلْقَمَرَ وَلَا ٱلَّيْلُ سَابِقُ ٱلنَّهَارِ ۚ وَكُلٌّ فِى فَلَكٍ يَسْبَحُونَ ﴿٤٠﴾

ويقال لبعض الأشياء إنه قديم ، وإن لم يكن له سنة ، ولهذا جاز أن يقال بيت قديم وبناء قديم ولم يجز أن يقال فى العالم إنه قديم ، لأن القدم فى البيت والبناء يثبت بحكم تقادم العهد ومرور السنين عليه ، واطلاق القديم على العالم لا يعتاد إلا عند من يعتقد أنه لا أول له ولا سابق عليه .

قوله تعالى : ﴿لا الشمس ينبغى لها أن تدرك القمر ولا الليل سابق النهار وكل فى فلك يسبحون﴾ .

إشارة إلى أن كل شيء من الأشياء المذكورة خلق على وفق الحكمة ؛ فالشمس لم تكن تصلح لها سرعة الحركة بحيث تدرك القمر وإلا لكان فى شهر واحد صيف وشتاء فلا تدرك الثمار وقوله (ولا الليل سابق النهار) قيل فى تفسيره إن سلطان الليل وهو القمر ليس يسبق الشمس وهى سلطان النهار ، وقيل معناه ولا الليل سابق النهار أى الليل لا يدخل وقت النهار والثانى بعيد لأن ذلك يقع إيضاحاً للواضح والأول صحيح إن أريد به ما بينته وهو أن معنى قوله تعالى (ولا الليل سابق النهار) أن القمر إذا كان على أفق المشرق أيام الاستقبال تكون الشمس فى مقابلته على أفق المغرب ، ثم إن عند غروب الشمس يطلع القمر وعند طلوعها يغرب القمر ، كأن لها حركة واحدة مع أن الشمس تتأخر عن القمر فى ليلة مقداراً ظاهراً فى الحس . فلو كان للقمر حركة واحدة بها يسبق الشمس ولا تدركه الشمس ؛ وللشمس حركة واحدة بها تتأخر عن القمر ولا تدرك القمر ؛ لبقى القمر والشمس مدة مديدة فى مكان واحد ، لأن حركة الشمس كل يوم درجة فخلق الله تعالى فى جميع الكواكب حركة أخرى غير حركة الشهر والسنة ، وهى الدورة اليومية وبهذه الدورة لا يسبق كوكب كوكباً أصلا ، لأن كل كوكب من الكواكب إذا طلع غرب مقابله وكلما تقدم كوكب إلى الموضع الذى فيه الكوكب الآخر بالنسبة إلينا تقدم ذلك الكوكب ، فبهذه الحركة لا يسبق القمر الشمس ، فتبين أن سلطان الليل لا يسبق سلطان النهار فالمراد من الليل القمر ومن

Picture.1.3

Fakhr al-Dīn al-Rāzi explains the position of the sun as the day ruler. When the moon is on the eastern horizon will not be preceded by the position of the moon, as the night ruler will not also be preceded. Then the sun will meet the moon in the western horizon. When the sun goes down, the moon rises. It reveals the regularity of the planets, so there will not a collision because each planet runs in its round orbit.[130] Fakhr al-Dīn al-Rāzi mentions there are seven kinds of planet in space one of them is the

[130] Ibid, Vol. 26, p. 73-74

moon which circulates faster than other planets. On the other hand, the moon has a rounded and broad orbit and its position is in the last order.[131]

2) Surah Al-Anbiyā' :33

وهو الذي خلق الليل والنهار والشمس والقمر ۖ كل في فلك يسبحون

"And it is He who created the night and the day and the sun and the moon; all [heavenly bodies] in an orbit are swimming."[132]

Based on the observations, the circulation of the planets (sun and moon) is not the same and the journey starts from east to west like the daily circulation of the sun. Fakhr al-Dīn al-Rāzi denied the earlier philosophers' opinion that the circulation of the planets began from west to east. In this case Fakhr al-Dīn al-Rāzi conveys the disagreement of the philosopher when all the planets circulate from east to west except when there are some planets that move slower than other planets such as the moon which they think it moves slowly because its position is far from the planet's largest orbit of the earth.[133]

As for the circulation of the planets with their rounded orbits, Fakhr al-Dīn al-Rāzi mentions some views of the scientists at that time, those are: (1) the silent orbits and moving planets, this view was rejected because it is impossible for a silent orbit in its place; (2) orbits and planets are equally moving, this opinion is prevalent because the movement of the

[131] Ibid, Vol. 26, 76
[132] Tim Qomari, *Al-Qur'an Terjemah Paralel Indonsia Inggris* ….op.cit, p. 156
[133] Ibid, Vol 22, 166-167

planets is influenced by the movement of its orbit; (3) moving orbits and silent planets, this opinion is justified because there is conformity with Qu'ran which shows the moving orbits while the other planets accompany.[134]

3) Al-Ra'd :2

وسخرالشمس و القمر ﷺكل يجري لا جل مسمي ج.....

"Then He established Himself above the Throne and made subject the sun and the moon, each running [its course] for a specified term."

Fakhr al-Din al-Razi mentions that the submission of the sun and the moon سخر الشمس والقمر as a sign of the existence of the Essence of creator and ruler that is Allah SWT.[135]

The existence of movement and the silence of the sun and the moon produce the balanced numbers and circulation at a certain time. As for the verse كل يجرى لا جل مسمي quoted from Ibnu 'Abbās: every day the sun circulates one hundred and eighty times completed for six months until it returns to the starting position, so such a month it is a proof of the God power against the planets creation in control with a certain rate of speed and slowness. In addition, Fakhr al-Dīn al-Rāzi also tries to correlate the phenomenon that will occur on the Day of Judgment such as the

[134] Ibid, Vol. 22, hlm 168
[135] Ibid, Vol. 26, hlm 12

phenomenon of splitting the sky, the gathering of the sun and the moon at the same time which has been determined.[136]

C. The Similirity of Nicolaus Copernicus and Fakhr al-Dīn al-Rāzi's thought

1. The sun as the center of the universe

Copernicus and Fakhr al-Dīn al-Rāzi have the same opinion that the sun as the center of the universe. Copernicus thinks that the sun is the center of the circulation of the planets, including the earth, while the moon is around the earth which then the earth revolves around the sun together. The planets which exist in outer space are circling the sun with their elongated orbital rotation, where the sun is the center of it. Similarly, according to Fakhr al-Dīn al-Rāzi, the sun has two headquarters in the sense of being the center or source, which are called *Murakkaz al-'Ālam* and *Fauqa Murakkaz al-'Ālam* and they are analogous to white and egg yolk color, in the sense of the sun (egg yolk) is likened to the center of the solar system while the other planets (white color) surround it over the yellow. This is as Fakhr al-Dīn al-Rāzi's interpretation in surah Yāsin: 40

لا الشمس ينبغي لها ان تدرك القمر و لا الليل سابق النهار ۚو كل في فلك يسبحون

"It is not allowable for the sun to reach the moon, nor does the night overtake the day, but each, in an orbit, is swimming."

Fakhr al-Dīn al-Rāzi explains the position of the moon as the night ruler which will not precede the sun as the day ruler when the moon is on the eastern horizon, then the sun will meet it in the western horizon, when the sun sets then the moonrises and vice versa. So, it shows the regularity of the planets and there

[136] Ibid , Vol 18, hlm 238

will be no collision because each running is accordance to its orbit (circular) is round.[137] According to Fakhr al-Dīn al-Rāzi, each planet has its own distinct orbit, both in terms of speed, slowness, and line lanes. As Fakhr al-Dīn al-Rāzi says that the center of the solar system is the sun while the other planets surround it Fakhr al-Dīn al-Rāzi also mentioned there are seven kinds of planets in space, one of which is the moon that circulates faster than other planets, besides the moon has a broad orbit of round shape and its position is in the last order.[138]

قوله تعالى : وكل في فلك يسبحون . سورة يس . ٧٧

على هذا الوجه لأن الكوكب له جرم فاذا شق السماء وتحرك فاما أن يكون موضع دورانه ينشق ويلتئم كالماء تحركه السمكة أولا ينشق ولا يلتئم ، بل هناك خلاء يدور الكوكب فيه ، لكن الخلاء محال والسماء لا تقبل الشق والالتئام ، هذا ما اعتمدوا عليه ، ونحن نقول كلاهما جائز . أما الخلاء فلا يحتاج إليه ههنا ، لأن قوله تعالى (يسبحون) يفهم منه أنه بشق والتئام ، وأما امتناع الشق والالتئام فلا دليل لهم عليه وشبهتهم فى المحدد للجهات وهى هناك ضعيفة ، ثم إنهم قالوا على مابينا تخرج الحركات وبه علمنا الكسوفات ، ولو كان لها حركات مختلفة لما وجب الكسوف فى الوقت الذى يحكم فيه بالكسوف والخسوف وذلك لأنا نقول للشمس فلكان (أحدهما) مركزه مركز العالم (ثانيهما) مركزه فوق مركز العالم وهو مثل بياض البيض بين صفرته وبين القيض والشمس كرة فى الفلك الخارج المركز تدور بدورانه فى السنة دورة ، فاذا جعلت فى الجانب الأعلى تكون بعيدة عن الأرض فيقال إنها فى الأوج ، وإذا حصلت فى الجانب الأسفل تكون قريبة من الأرض فتكون فى الحضيض ، وأما القمر فله فلك شامل لجميع أجزائه وأفلاكه وفلك آخر هو بعض من الفلك الأول محيط به كالقشرة الفوقانية من البصلة وفلك ثالث فى الفلك التحتانى كما كان فى الفلك الخارج المركز فى فلك الشمس وفى الفلك الخارج المركز كرة مثل جرم الشمس وفى الكرة القمر مركوز كمسمار فى كرة مغرق فيها ويسمى الفلك الفوقانى الجوزهر والخارج المركز الفلك الحامل والفلك التحتانى الذى فيه الفلك الحامل الفلك المماثل والكرة التى فى الحامل تسمى فلك التدوير ، وكذلك قالوا فى الكواكب الخمسة الباقية من السيارات غير أن الفوقانى الذى سموه فلك الجوزهر لم يثبتوه لها فأثبتوا أربعة وعشرين فلكا ، الفلك الأعلى وفلك البروج ، ولزحل ثلاثة أفلاك الممثل والحامل وفلك التدوير ، وللمشترى ثلاثة كما لزحل ، وللمريخ كذلك ثلاثة ، وللشمس فلكان الممثل والخارج المركز ، وللزهرة ثلاثة أفلاك كما للعلويات ، ولعطارد أربعة أفلاك الثلاثة التى ذكرناها فى العلويات ، وفلك آخر يسمونه المدير ، وللقمر أربعة أفلاك والرابع يسمونه فلك الجوزهر والمدير ليس كالجوزهر لأن المدير غير محيط بأفلاك

Picture.1.4

[137] Ibid, Vol 26 p. 73-77
[138] Ibid, p. 75

D. The Distinction of Nicolaus Copernicus and Fakhr al-Dīn al-Rāzi's Interpretation in the Mafātiḥ al-Ghayb Tafsīr Book

1. The Sun Circulates on the outline

After Copernicus states that the sun is the center of the solar system where the sun is accompanied by the planets that surround it, then he also states that basically the sun also rotates on the axis. Because the true thing which runs around the sun are planets and moon, and the moon circling the earth then also circling the sun, the moon circulates around the globe in an average sinodis averaged over 29 days 12 hours 44 minutes 2.8 seconds. In heliocentric theory, Copernicus does not deeply explain how the movement of the sun, he merely says that the sun is just revolving around its axis only, in the sense that the sun doesn't only move in its place of light. In this case Copernicus's opinion at a glance is in line with Fakhr al-Dīn al-Rāzi's opinion which also says that the sun revolves on its axis.

While Fakhr al-Dīn al-Rāzi adds that the sun spinning on its axis, the sun also runs around the earth, so when the earth and the moon surround the sun, the sun also goes around, this is what causes the turn of day and night. As interpretation on the surah Yāsin verse 38: والشمس تجري لمستقر لها ذلك تقدير العزيز العليم in that verse Allah SWT uses the word تجري in the sense of running. In Arabic not just a word تجري which has a meaning 'running', but there is a word سرى-يسرى which

also has the meaning of running as mentioned in surah al-Israa verse 1 سُبْحَانَ الَّذِي أَسْرَى بِعَبْدِهِ لَيْلًا مِنَ الْمَسْجِدِ الْحَرَامِ إِلَى الْمَسْجِدِ الْأَقْصَى In this verse Allah SWT uses the word أَسْرَى which means that "God walks his servant one night from the al-Haram mosque to the al-Aqsa mosque ". In this case said أَسْرَى which is a form of word fragmentation of words سرى-يسرى has a meaning, which is meant run here is to go on and not to return to the place where it started (in the sense of running but not to his stop) that is telling the events of *Isra 'Mi'raj* when Prophet Muḥammad SAW walked from the mosque of al-Harām to the mosque of *al- Aqshā* (the passage of the Prophet from the *al-Harām* mosque does not return to the starting place/to the mosque of *al-Harām*, but continue to walk up to *the al-Aqshā* mosque). Whereas in Surah Yāsin verse 38 Allah SWT uses the word تجري because the meaningful of that word goes that will return to the place of dismissal, in which it is interpreted by Fakhr al-Dīn al-Rāzi that the sun circulates from its stopping point and will return to its place of dismissal. The verse above is meaning, go, walk, circulate, or flow. Since the subject of the verse is the sun, the exact meaning is circulated, which means that the sun is circulating to the place of dismissal.

The opinion of Fakhr al-Dīn al-Rāzi is also in line with opinion of Imām Nawāwi, in his Tafsīr (*Tafsīr Marāḥ Labīd*). Imām Nawāwi said that in addition

to the sun spinning on its axis, the sun also goes to its place of dismissal, in this case the place where the dismissal of the sun is under the *arsy*[139] which when beneath *arsy* bowed to God on every night for a whole night later when the day God gave permission to the sun to rise from the east like ordinary sun was commanded by God to come out from the east. But at the end of time God will no longer allow the sun to rise from the east, but God commands the sun to rise from wherever the sun likes, then the sun will rise from the west and this is one sign of the judgment day.

The author assumes that if the sun is just silent and does not move, then there will be no turning of the day and night, as Imām Nawāwi explains that if the sun does not move, then half the earth will gradually burn. Because even if the earth revolves around the sun but if the sun is silent, then the heat of the sun will not affect the whole part of the earth, so the rest of the earth will freeze because it is not exposed to the heat of the sun. Therefore there is some evidence that the sun moves :

1) The turning of day and night. Among the proofs of the power of God with his beautiful creation is the turning of day and night. This is one of the main functions of the sun in addition to be a source of life as well as the evidence of the day and night existence. It cannot be imagined if for 24 hours there is only day. This has been mentioned many times in Qur'an al-Karim17, because remembering this astronomical phenomenon is very important for the life of mankind as well as other creatures which

[139] Imām Nawāwi, *Tafsīr Marāḥ Labīd,* Jilid 2, (Bandung: Syirkah al-Ma'ārif, tt), p. 210

live on earth. This God's verse is one of the things to be thought in order to serve as proof of the greatness of the Creator. The night is sorted from day and afternoon, sorted by night. As a result of the rotation of the earth surrounding its axis from west to east called the motion of the earth's rotation and the passage of the sun, then the sun appears on the eastern horizon and set on the western horizon with a very regular and beautiful.

2) The sun's ultimate motion in addition to the sun is manifestly seen in the annual circulation in the middle of the community of stars. As a result of the earth circulation, the earth around the sun once a year called the motion of the earth's revolution. It has also been proven by the experts recently that the sun also has another essential movement: first, the circulation of the sun on its axis 1 time on every 26 days. This is shown by the observation of the sun's stains, the black spots that appear on the surface from time to time, which turns its places do not settle on the surface of the sun, and covered the distance between two solar circles within 13 days. Then the circulation of the sun (with all the celestial bodies which follow it, the planets and with the moon respectively) surrounds the center of the universe (star system) at a speed of about 200 miles per second. So the sun is one of the millions of stars that make up this universe, and it is the evidence that the universe or star system is circulating around its center. And because the sun was not fixed at its center, then the sun has a movement around. As for who became the understanding of the exact scientists about the word مfrom a body that

moves around is that the words mean a fixed axis where the rotating motion is centered on it or means the center of the circle of this movement. With the first meaning, then م means the outstretched line between the two poles of the sun. Whereas in the latter sense, م means the center of the celestial star system, in which all stars circulate around the sun.

3) The sun movement as already said that the sun circulates around the earth in the outward movement arising from the circulation of the earth around the sun. The outward movement is like the way the train passengers feel when they see trees, telephone poles and villages which seem to move without their feeling on their own movements, as they are on the train.

Thus, the movement of the sun has a result of the earth circulation around the sun in the middle of other stars on a very wide circular with a diameter of 93 million miles. The earth circulates around the sun once a full cycle in one year. This movement is shown by the shifting of the sun in the middle of the buruj with the standard of one buruj on a monthly basis, or one degree per day.

In this case the author think, event Fakhr al-Dīn al-Rāzi assume that the sun runs around the earth, but it will not broke his hypotheses that the solar is the center of universe that in line with heliocentric theory of Nicolause Copernicus, because the main point of heliocentric theory is the solar as the center of universe, this case has been explained by Nicolaus Copernicus that what appear to us as motions of the Sun arise not from its motions but from the motion of the Earth and

our sphere, with which we revolve about the Sun, like any other planet. The Earth has, then, more than one motion.[140]

2. Number of Planets that surround the Sun

In the case of Copernicus and Fakhr al-Dīn al-Rāzi's solar system centers having the same opinion that the sun is the center of the solar system, Copernicus has a different opinion from Fakhr al-Dīn al-Rāzi regarding the number of planets that surround the sun.[141] In this case it can be concluded that Fakhr al-Dīn al-Rāzi said that the moon is a planet, not a satellite that surrounds the earth. Meanwhile, according to Copernicus the moon and the planet are different things as he explains that the moon and planets circle the sun in a similar orbit, it means that the moon and the planet are different, while the moon is a planet that follows the sun.

3. Orbit Lines Planets

According to Copernicus, the planets are in outer space surround the sun with their rounds of elliptic orbits. Then it's perfected by Johanes Kepler in Law 1, the laws of the ellipse (1609). Johanes Keppler explaine the planetary orbit of Copernicus model was later refined by Johannes Kepler (1572-1630), an assistant and successor of an astronomer Tycho Brahe. Kepler identifies the orbital properties of planets based on the analysis of Brahe's astronomical telescope data (Tycho Brahe, 1546-1601) and he presents three laws as follows:[142]

[140] Nicolaus Copernicus, On the Revolutions of the Heavenly Spheres……op.cit, p. 16
[141] Fakhr al-Din al-Razi, *Mafatih al-Ghayb*, Vol. 26…..op.Cit, p. 76
[142] Bayong Tjasyono, *Ilmu Kebumian dan Antariksa*…. Op.Cit, p. 27

a. Law 1 is ellipse law (1609)

The planets move in an elliptical orbit to the sun that lie on one of the long axis focuses. This law states that the planet's orbit is an ellipse not a circle, see figure 2.3.

b. Law 2 is same broad law (1609)

The area (dS) which is crossed by the connection line between the planets and the sun in the same time interval (dt) is also the same, but not for the orbital velocity.

Kepler’s law (2)

As a result, the planet moves faster in its orbit if it is near the sun (perihelion) rather than if the planet is in the aphelion which has the farthest distance to the sun. The velocity of the planet is inversely proportional to the distance between aphelion and perihelion, see figure 2.4.

c. Law 3 is harmonic law (1618)

The cubic ratio of the planet's mean distance to the sun (d) by the square of its revolutionary period (T) to the sun is the same for all planets, it will be written in algebra: Kepler's law (3) states the relation between the planets and the sun with a revolutionary period ranges from 88 days for the nearest planet Mercury and from 248 years for the farthest planet Pluto.

If the earth as a reference, the distance of the earth and the sun is 150 × 106 km Astronomical Unit (AU), and the period of the earth revolution is one year, then the constants c = 1

Based on the Keppler's law, the planets move in an elliptical orbit to the sun which lies in one focus on the long axis. This law states that the planet's orbit is an ellipse not a circle or a round one. Due to an elliptical planetary orbital path, so it is long as a planet moves around the sun through a full cycle called one-year planeter, the distance between the planet and the Sun will always change. The point on the planet's orbital path which marks the planet's closest position to the Sun is called perihelion. While the point on the orbital path of the planet which marks the farthest position of planet to the sun is called aphelion. The direction of the planets rotates in the opposite direction with the clockwise direction, except for the planets Venus and Uranus. Astronomers set the direction of rotation counter clockwise with directional direction, while the direction of rotation in the direction of clockwise rotation is called a retrograde. Meanwhile, according to Fakhr al-Dīn al-Rāzi circulation of planets with orbit (circular) is round, Fakhr al-Dīn al-Rāzi mentions some views of scientists at the time, among others: (1) idle orbits and moving planets, this view is rejected as impossible for a silent orbit in place; (2) orbits and planets are equally moving, this opinion is prevalent because the planets move because they are influenced by their orbital movement; (3) moving orbits and silent planets, this opinion is justified because there is

conformity with the al-Quran which shows moving orbits while other planets accompany.[143]

Al-Ra'd :2

وسخرالشمس و القمر ﷺ كل يجري لا جل مسمي ج.....

"then He established Himself above the Throne and made subject the sun and the moon, each running [its course] for a specified term"

4. Interpretation of Nicolaus Copernicus' and Fakhr al-Dīn al-Rāzi's though about the Solar Circulation

After being seen and analyzed, the opinion of Copernicus and Fakhr al-Dīn al-Rāzi regarding to the solar circulation tend to be different, then its similarity is the sun as the center of the solar system. In this case, Fakhr al-Dīn al-Rāzi is in line with Nicolaus Copernicus' Heliocentric theory, theory which states that the sun as the center of the planets circulation, including the earth. While the moon circles the earth, then the moon and the earth revolve around the sun together. But by this kind of the dissent, it doesn't mean one of both of them is fault, because every opinion always consisting of different reason and experiment. Nicolaus Copernicus find the theory based on science experiment of the universe in order to look for invention of scientific theory, then he complete the heliocentric theory, until he claimed to be brave to explore the theory of heliocentric even he face so much obstacle from the church's dogma and regulation, and the result of his effort, he success to inspire another scientist to improve the heliocentric theory after his period, like Giordino Bruno, Galilio

[143] Fakr al-Din al-Razi, , Mafatih al-Ghayb, Vol. 22….op.Cit, p. 168

Galilei, Johanes Kepler etc. Meanwhile, Fakhr al-Dīn al-Rāzi explain his taught based on his interpretation about solar circulation from verses of Quran.

A relationship appears between the science and religion, it is also known as four typologies of science and religion[144], and one of the elements of religion in it is the scripture. In this case the scripture intended by the author is the holy book of Qur'an, in which there is a relationship between the science and Qur'an.

First, the conflict typology, this typology is to assume that the religion and science are sometimes contradicting and conflicting, this can be seen from Copernicus and Fakhr al-Dīn al-Rāzi's different opinions.

Second, the Independence typology, this case tries to avoid the conflict between the science and religion by separating those two fields in two different areas. Both can be distinguished based on the problem being reviewed, the referenced domain, and the method used. In this case the differences of opinion between Copernicus and Fakhr al-Dīn al-Rāzi cannot necessarily be misjudged whether one of them wrong or true, but it must be distinguished from the background of thought, basis and other influences.[145]

Third, *the Dialogue Type* establishes a closer relationship between science and religion than the views of Conflict and Independence typology, using the Dialogue type will consider the pre-assumption in scientific effort or explore the

[144] Ian G Barbour, *Religion an Age of Science* ...p. 3-4
[145] Ibid, p. 5

alignment of methods between Copernicus and Fakhr al-Dīn al-Rāzi's views on pre-responses, methods, and concepts.

Fourth, the Integration Type in natural theology, there is a claim which states that God's existence can be inferred from (or supported by) the evidence of the universe formation. The nature also makes us more aware to the power of God. In this case, by studying the science can make the humans more feel God's greatness. As in the studying of Fakhr al-Dīn al-Rāzi's interpretation in *Mafātiḥ al-Ghayb Tafsīr*, by using Fakhr al-Din al-Razi's description we can know that Qur'an not only explains about *tauḥīd* and *syarī'ah* but also about the science. This doesn't mean the scientific interpretation style always matches with Qur'an and the science, but this evidence shows that Qur'an has many rich explanations. This is why the humans are ordered to think of the verses of Allah, because in Qur'an there is a meaning which has not been revealed in the terms of the meaning. Besides, Allah also ordered humans to take care of God's creation, so that people will be always grateful and not be arrogant.

CHAPTER V

CONCLUSION AND SUGGESTION

A. Conclusion

Based on the author analysis and discussion about Nicolaus Copernicus and Fakhr al-Din al-Razi's interpretation of Solar Circulation. Then the author create the conclusions below:

1. The heliocentric theory of Nicolause Copernicus assume that sun as the center of the universe, and the sun is the center of the circulation of the planets, including the earth, while the moon is around the earth which then the earth revolves around the sun together, and also the sun is just revolving around its axis only.
2. Similar with Copernicus, Fakhr al-Dīn al-Rāzi assume that the sun as the center of the universe, but Fakhr al-Dīn al-Rāzi believe that the sun spinning on its axis, the sun also runs around the earth, so when the earth and the moon surround the sun, the sun also goes around.
3. The author find only one similarity between Copernicus and Fakhr al-Dīn al-Rāzi's thought that is both of them believe that sun as the center of the universe. But behind this similarity, so many differences between Copernicus and Fakhr al-Dīn al-Rāzi's thought such us 3th different things: the first is about sun circulates on the outline, the second about number of planets that surround the sun, the third about the orbit lines planets.

B. Suggestion

Based on the conclusion above, there are suggestion for the next researcher and all the reader:

1. The next researcher may give the additional data and explanation about solar circulation according to Heliocentric theory of Nicolaus Copernicus and Fakhr al-Dīn al-Rāzi, because the author only explain and compare between two consideration, the next researcher may compare more than 2 consideration.
2. The *mufassir* may not only research about *syarī'ah* and *ubūdiyah* expert, but also improve they interpretation about scientific, because scientific and al-Qur'an are two thing as one that couldn't be parted.
3. If there are so many *mufassir* that talking about universe in their *tafsīr*, it will be interested the people to learn al-Qur'an because they think that al-Qur'an is not consist about Islamic law but also many things.
4. The author wish this research may give a positive contribution toward the development of scientific knowledge of Qur'an, especially in the interpretation aspects and the interpretation of solar circulation. Besides that, this research can be made as the additional information, reference, and source material in conducting further researches.
5. For the institution part of IAIN Jember, especially for Faculty of Ushuluddin, Art, and Humanities, this research may increase the knowledge and addition academic references in developing Qur'anic

science recently and comprehensively, also it becomes the additional collections in enriching the treasury of interpretation.

REFERENCES

AA, Gus. 2004, *Matematika Al-qur'an*, Surakarta, Rahma Media Pustaka

Abdul, Hamid Muhsin. 1974 *al-Rāzi Mufassiran*, Baghdad: Dār al-Hurriyah li al-Tab'ah

Akib, Mohd. 2012, *Penghubi Syurga Menurut Pandangan Fakhr al-Dīn al-Rāzi*: *Tumpuan Terhadap Tafsīr Mafātiḥ al-Ghaib*, Ushuluddin Journal: Januari-Juni

Al-Dzahabi, Muhammad Husayn. t.t, *Al-Tafsir wa al-Mufassirun*, vol 1, Kaherah: Maktabah Wahbah

al-Dzahabi. 2005, *Al-Tafsīr wa al-Mufassirūn*, Cairo: Dar el-Hadits.

Al-Qattan, Manna' Khalīl, 1992, Studi Ilmu-Ilmu Qur'an, translated by Mudzakkir, Bogor: Pustaka Litera Antar Nusa.

Al-Rāzi, Fakhr al-Dīn. 1981, *al-Mutasyāhidu bi al-Tafsīri al-Kabīr wa Mafātiḥ al-Ghayb*, Beirut: Dar al-Fikri.

al-Shalih, Shubhi. 1997, *Mabāḥits fī 'Ulūm al-Qur'ān*, (Beirut: Dar al-'Ilm lil Malayin

Al-Zamaksyari. t.t *Al-Kasyaf 'an Haqaiqi Ghawamidhi al-Tanzil wa 'Uyun al-Aqail*, 3rd Chapter, Maktabah Aikabah

Anwar Rosihon. 2015, *Ilmu Tafsir (Edisi Revisi)*, Bandung: CV. Pustaka Setia.

Anwar, Syaifullah. 2008, "Penafsiran al-Rāzi terhadap Fitnah dalam Al-Qur'an (Studi Deskriptif Analisis Tafsīr Mafātiḥ al-Ghayb)", Thesis. Tafsir Hadits Program Faculty of Ushuluddin State Islamic University Sunan Kalijaga Yogyakarta.

Azhari, Susiknan. 2008, *Ensiklopedia Hisab Rukyat*, Yogyakarta: Pustaka Pelajar

_____. 2010, *Perkembangan Kajian Astronomi dalam Islam di Alam Melayu*, Fiqh Journal

Azizah, Nur. 2017, *Peredaran Bulan dalam Qur'an*, (Telaah Tafsīr Mafātiḥ al-Ghaib), Thesis. Faculty of Qur'an and Ushuluddin interpretation, art and humanities of IAIN Jember.

Barbour, Ian G. 1990, *Religion an Age of Science*, Harper: San Fransisco.

Bucaille, Dr. Maurice. 1992, *Al-Qur'an dan Sains Modern (Terjemahan The Bible, the Qur'an and Science)*, Jakarta: Media Dakwa

Cahyani, Djaya. 2011, *Takdir dalam Pandangan Fakhr al-Dīn al-Rāzi*, Thesis. Tafsir Hadits Program of Faculty of Ushuluddin State Islamic University of Syarif Hidayatullah Jakarta

Copernicus, Nicholas. 1543, *On the Revolutions of the Heavvenly Spheres*, Canada: Pythagoras Publishing.

_____. 2003, *Father of Modern Astronomy*, Blackbirch Inc.

Efendi, S. Anwar. 1994, *Alam Raya dan Al-Qur'an*, Jakarta: PT. Pradnya Paramita

Fakhr al-Dīn al-Rāzi. 1414/1994, *Tafsīr Mafāṭih al-Ghaib*, Beirut: Dar al-Fikr

Fitri, Idatul. 2011, *Buku Pintar Tata Surya*, Yogyakarta: Harmoni.

Goldziher, Ignaz. 2015, *Madzhab Tafsir dari Klasik hingga Modern*, transalated by M. Alaika Salamullah, Yogyakarta: Kalimedia

Griffel, Frank. 2007, *On Fakhr al-Din al-Razi's Life and The Patronage He Received*, Journal of Islamic Studies

Ilyas, Hamim. 2004, *Studi Kitab Tafsir*, Yogyakarta: Teras

Ismail, Ecep. 2012, Kritik Metodologi Tafsir (Studi al-Dākhil dalam Tafsir Mafātiḥ al-Ghayb by Fakhr al-Dīn al-Rāzi), State Islamic University of Sunan Gunung Djati Bandung.

Joesoef, Muhd Syamsoeri, 2005, *Kitab Tafsir Mafātiḥ al-Ghayb (Studi Pemikiran al-Rāzi tentang Nasakh al-Qur'an),* Dissertation. Science of Islamic Religion State Islamic University of Sunan Kalijaga Yogyakarta.

Kementrian agama RI. 2010 *Al-Qur'an dan Tafsirnya*, Jakarta: Kementrian Agama

Kerrod, Robbin. 1999, *Bengkel Ilmu Astronomi*, Jakarta: Erlangga

Lajnah Pentashihan Mushaf Al-Qur'an, Badan Litbang dan Diklat Kemenag RI, LIPI. 2012, *Pencipaan Jagat Raya: Dalam Prespektif al-Qur'an dan Sains*, Kemenag RI: Jakarta

Mahmud, Mani' Abdul Halim. t.t, *Manāhij al-Mufassirīn,* Beirut: Dār al-Kitāb li al-Bayān

Mahmud, Mani'Abd Halim. 2006, *Metodologi Tafsir (Kajian Komprehensif Metode Para Ahli Tafsir*, Jakarta: PT. Grafindo.

Muhammad Ibn Yusuf al-Syahid bi Abi Hayyan al-Alusi, Tafsir Bahr al-Muhith, (Lebanon:Dar alK-Kutub al-'Alamiyah)

Mulyono, Agus. 2006, *Fisika dan al-Qur'an*, Malang, UIN Malang Press.

Mundir. 2015, *Metode Penelitian Kualitatif dan Kuantitatif*, Jember, Stain Jember.

Muqawim. 2007, *Jaringan Keilmuan Astronomi dalam Islam pada Era Kalsik*, Jurnal Kaunia, Vol. 3

Nasr, Sayyid Husein. 1993, *The Islamic Intelectual Tradition in Persia,* New York: Harper Collins

Nasution, Andi Hakim. 1989, *Pengantar ke Filsafat Sains,* (Jakarta: Pustaka Litera Antarnusa

Nasution, Haru . 1992, *Ensiklopedi Islam Indonesia,* Jakarta: Djambatan

Nisa, Khoirun'. 2002, *Peredaran Matahari: Studi Kasus atas Penafsiran Tanthawi Jauhari dalam Kitab Tafsir Al-Jawāhir fi Tafsīr Al-Qur'anī Al-Karīm,* Thesis of Faculty of Ushuluddin and Islamic Thought State Islamic University of Sunan Kalijaga, Yogyakarta.

Nuramin. 2011, *Antromofisme dalam Tafsīr Mafātiḥ al-Ghayb (karya Fakhr al-Dīn al-Rāzi),* Thesis. Tafsir Hadits Program of Faculty of Ushuluddin State Islamic University Gunung Djati, Bandung.

Nurjanah, Siti. 2008, *Kosmologi dan Sains Islam*, STAIN Metro

Partanto, Pius A. 2011, *Kamus Ilmiah Populer*, Surabaya: Arkola.

PDF Mohammad Faiz bin Jani, t.t, *Muzakirah Ilmu Falak*, Universiti of Malaya: Malaysia

Praswoto, Andi. 2011, *Metode Penelitian Kualitatif: Dalam Perspektif Rancangan Penelitian*, Yogyakarta: Ar-Ruzz Media.

Prawoto, Budi. 2014, *Serba-serbi Tata Surya*, Yogyakarta: CV Empat Pilar Pendidikan

Rosadisastra, Andi. 2007, *Metode Tafsir Ayat-ayat Sosial*, Jakarta: Amzah.

Shihab, Quraisy, 2007 *Ensiklopedia al-Qur'an: Kajian Kosa Kata*, Jakarta: Lentera Hati.

Shihadeh, Ayman. 2006, *Islamic Philosophy Theology and Science*, Leiden: Brill

Slamet Hambali. 2013, *Astronomi Islam dan Teori Heliocentris Nicolaus Copernicus*, al-Ahkam Journal, 23th Volume, Semarang: IAIN Walisongo.

Supiana dan M. Karman. 2002, *Ulumul Qur'ab dan Pengenalan Metodogi Tafsir*, Bandung: Pustaka Islamika

Thayyarah, Dr.Nadiah. 2013, *Buku Pintar Sains dalam Al-Qur'an*, Jakarta: Zaman

Tim Penyusun. 2015, *Pedoman Penulisan Karya Ilmiah Jember*, Jember: IAIN Jember Press.

Tim Tafsir Ilmiah Salman ITB, 2014, *Tafsir Salaman Tafsir Ilmiah Atas Jus Amma*, Bandung: Mizan

Tjasyono, Bayong. 2013 *Ilmu Kebumian dan Antariksa*, Cet. 6, Bandung: PT. Remaja Rosdakarya

Ulinnuha, Muhammad. 2015, *Rekontruksi Metodologi Kritik Tafsir*, Jakarta: Azzamedia.

Waston, 2014, *Hubungan Sains dan Agama: Refleksi Filosofis atas Pemikiran Ian G. Barbour*, Profetika Journal 23th Volume, Ushuluddn Program Faculty of Islamic Religion of University of Muhammadiyah Surakarta.

Yuyun Zunairoh, *Penafsiran al-Qur'an dengan Filsafat: Telaah Kitab Mafātiḥ al-Ghaib Fakhr al-Dīn al-Rāzi*, Jurnal Emprisma, Vol. 24

Zeid, Mestika. 2004, *Metode Penelitian Kepustakaan*, Jakarta: Yayasan Obor Indonesia.

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Hereby declare that the thesis entitled The Solar Circulation Concept (Comparison Study of Heliocentric Theory of Nicolaus Copernicus in *On the Revolutions of the Heavenly Spheres* Book and Fakr al-Dīn al-Rāzi's Interpretation in *Mafātiḥ al-Ghayb* Tafsir Book) is all my result of research except the section that already have been references.

Hereby this statement is made truthfully and to be used accordingly.

Jember, March 19th 2018

Signed

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